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Taylor's 7th Teaching and Learning Conference 2014 Proceedings

Holistic Education: Enacting Change

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Part I
Introduction

Whole Teachers: An Inquiry into Krishnamurti's Educational Philosophy

Anbananthan Rathnam

Abstract The purpose of this qualitative research study, which utilizes a phenomenological inquiry method, is to inquire into the awareness of what it means to be a whole teacher from the perspective of the philosophy of Jiddu Krishnamurti, a philosopher/spiritual teacher. Four participants (teachers) were interviewed from the Oak Grove School, an alternative, holistic school founded by Krishnamurti in 1974. This inquiry probed into teachers' thinking, teachers' lives, teachers' inner lives, teachers' contemplative practices, teachers' calling/vocation, and teachers' pedagogy. The findings of this inquiry reveal the awareness that exists among the participants with regard to their understanding of Krishnamurti's educational philosophy and the way in which this philosophy has shaped their lives and the lives of their students (both implicitly and explicitly). The findings from this research further show that Krishnamurti's philosophy has certainly had an impact on the participants' wholeness. Krishnamurti was never interested in imposing his philosophy on the teachers to think in a narrow groove. Rather, he challenged them to arrive at wholeness or a holistic approach towards living by their own volition, by putting aside all philosophy, including his own. This research points towards the possible ways in which wholeness can be developed using innate wisdom (teachers' inner life, teachers' calling), wisdom gained through experiencing life (teachers' life, teachers' thinking), wisdom gained through their teaching experience (teachers' pedagogy), and wisdom gained through practices that bring harmony to the mind, body, and spirit (teachers' contemplative approaches).

Keywords Whole teachers • Krishnamurti's educational philosophy • Holistic education • Teacher education

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1 Introduction

The word "educate" with its Latin root *educere* or its English equivalence of *educe* means to bring out or to evoke something potential, hidden, and latent. But if we look at the current education system, it seems as though knowledge or information is "fed" into the students, rather than bringing out their full potential. Thomas Moore adds to this notion in J.P. Miller (2000) that since the "usual practice is to stuff what we consider valuable into a mind…this approach should logically be called *in*ducation – forcing in, not leading out" (p. vii). Since the current approach to education seems to be the opposite of what it means to educate, we find that this kind of education has damaged the relationship between the head and heart, between talent and passion. As a consequence of this damage, J.P. Miller (2007) adds that "in industrialized society we live in our heads, denying our deeper knowing and intuitions" (p. 4).

The focus of this empirical research is to explore the wholeness of teachers who are teaching in a Krishnamurti school, which can be described as a type of holistic, alternative school as opposed to a public school. I am situating myself as a researcher probing into the curriculum of teachers' inner lives. My intention in investigating teachers' wholeness is to enhance the literature of teachers' spirituality and wholeness, particularly their inner lives. The implications of this study will be to inform, augment, and add to present understanding of what it means to empirically explore teachers' wholeness.

One of the important philosopher or spiritual teacher who has deeply affected the way I view education and spirituality is Jiddu Krishnamurti, who founded seven holistic schools around the world. Krishnamurti (1953) felt deeply that "the function of education is to create human beings who are integrated and therefore intelligent… [and that] education in the true sense, is the understanding of oneself, for it is within each one of us that the whole of existence is gathered" (pp. 14–17). I consider Krishnamurti's perception of the creation of an integrated human being as being synonymous to what it means to observe wholeness.

Educators need to have experienced or be in the process of experiencing wholeness before attempting to develop wholeness in their students. Since the common goal of holistic schools is to develop the conditions that would allow the observation of one's wholeness, the wholeness of teachers or the exploration of teachers' inner lives needs to be the foundation before creating the fertile ground for students to observe wholeness. Palmer (1998) echoes this perception by asserting that teachers cannot take their students where they have not been themselves.

1.1 Research Questions

My research focuses on the wholeness of teachers in a Krishnamurti school and how their wholeness affects or informs their pedagogy and curriculum design.

My main research question is:

What is the impact of Krishnamurti's philosophy on teachers' wholeness?

Sub-research questions include:

1. What are the major motivations for teachers who choose to teach in a Krishnamurti school?
2. What events in a teacher's life have influenced his/her decision to become a teacher?
3. What are aspects of teachers' inner lives that nourish their wholeness within?
4. What are aspects of teachers' inner lives that connect to their vocation or calling?
5. What are some of the contemplative approaches that the teachers engage in and how do these practices influence or affect their spirituality or inner lives?
6. What aspects or themes of Krishnamurti's philosophy (e.g., fear, choiceless awareness, conditioned mind, intelligence, etc.) do the teachers use explicitly or implicitly as their guiding principles in relation to their pedagogy and curriculum design?

1.2 Krishnamurti on Teachers

Jiddu Krishnamurti was born in 1895 in Madanapalle, South India. The following schools operate under the guidance of Krishnamurti Foundation India (KFI), Krishnamurti Foundation Trust (KFT), and Krishnamurti Foundation America (KFA): Brockwood Park School in the United Kingdom; the School, the Valley School, Rajghat Besant School, Bal Anand, Sahyadri School, and the Rishi Valley School in India; and the Oak Grove School in the United States.

Krishnamurti emphatically explains that teachers play a central role in bringing about fundamental changes in students in order to make them whole. The transformation orientation discussed in J.P. Miller and Seller (1985) reflects an educational approach geared towards wholeness. Krishnamurti (1953) states that if the educator has not been rightly educated, he or she will educate from their fragmented state of mind and adds that "the problem…is not the child, but the teacher [and therefore] the problem is to educate the educator" (p. 100). Krishnamurti (1953) feels that because educators are not whole and conditioned, they must begin to observe their own limitation; he further claims that "out of this watchfulness comes intelligence, and with it a radical transformation in his relationship to people and things" (p. 105).

1.3 Spirituality and Wholeness in Education

The contributions to the literature of holistic education include contemporary holistic educators (Miller 1993, 1994, 2000, 2006, 2007; Flake 1993; Wright 2000; Moffett 1994; Palmer 2000, 1998; Kessler 2000; Glazer 1999; Mayes 2005a, b; Forbes 2003; Lin 2006; Crowell et al. 1998; Lantieri 2001; Fox 2002; Marshak 1997), pioneers of holistic education (Rousseau 1762; Froebel 1887; Emerson 1996; Thoreau 1950; Alcott 1938; Parker 1969; Neill 1960; Jung 1969; Krishnamurti 1953, 1973, 1974, 1975). Also included are other pioneers of holistic education who developed holistic schools based on their respective philosophy that resemble and point in the direction of spirituality like Maria Montessori, Rudolf Steiner, and Jiddu Krishnamurti.

The word spirituality originated from merging the Latin word for breath, "spiritus," with "enthousiasmos," the Greek word for enthusiasm that means "the God within." Thus, the resulting word, spirituality, as explained in Lindholm and Astin (2006), essentially means "capturing the dynamic process of divine inspiration or the breath of God within" (p. 64).

Although spirituality has often been viewed within the context of religious faith or religion, at present there are an increasing number of people whose understanding of spirituality is either unclear or not at all associated with an established religions faith (Fuller 2001). It means that people are becoming increasingly comfortable with spirituality without associating it with a religious faith. In my opinion, this has brought about an interfaith dialogue, which is an excellent tool for a group of people who feel the need to embrace religious pluralism. Rambachan (2000) explains that in embracing religious pluralism, "it requires one to seek out, know, and build relationships with the neighbor of another faith" (p. 173). Eck (1993) claims that "religious pluralism requires active positive engagement with the claims of religion and the facts of religious diversity and an active effort to understand difference and commonality through dialogue" (p. 192). With regard to the differences and similarities that exist among major faiths/religions, J.P. Miller (2007) asserts that there seem to be more similarities than differences among the faiths and that "these commonalities have formed the core of the perennial philosophy" (p. 34).

The word wholeness implies a state where one has a balanced approach towards life. One of the synonyms of the word "healthy" in the Webster's Dictionary is "wholesome." The word healthy is also a synonym of the word "hale," which means being *whole* or free from disease. The word "holy" also has the same root as *whole*. Thus, etymologically speaking, *wholeness* seems to be the primary goal of life since it means keeping our health in good condition, free from disease; and also, being in this state constitutes full development of the mind, body, and spirit. Bohm (1976) adds that the early notion of *wholeness* "indicates that man[1] has sensed always that wholeness or integrity is an absolute necessity to make life worth living" (p. 3).

[1] Referring to the human race.

Nurturing Our Wholeness published in 2002 is an excellent text that discusses the traditions, teachers, and practices of attending to our wholeness. J.P. Miller and Nakagawa (2002) discuss the process of nurturing wholeness as one of the aims of education and affirm that "the aim of education should include the development of the whole person: intellect, emotions, body and spirit" (p. vi). The authors also looked at the lack in schools today and warn that "schools now are focusing on a few skills that can be tested…[and] we treat our students like products whose value seems to be their grades and test scores" (p. vi). J.P. Miller and Nakagawa (2002) also present great hope of evolving from this narrow vision of testing, by synthesizing the Eastern and Western visions or teachings of wholeness and spirituality.

1.4 Aspects of Teachers that Contribute Towards Wholeness

In this section, six factors which contribute to a deeper inquiry into teachers' wholeness will be discussed in order to get a better understanding of their wholeness. These are teachers' thinking, teachers' lives, teachers' inner lives, teachers' vocation/calling, teachers' contemplative practices/approaches, and teachers' pedagogy and curriculum design. A research study on teachers' wholeness may not point directly towards wholeness but can point towards their thinking, lives, inner lives, calling, contemplative approaches, and pedagogy in order to gain a deeper understanding of wholeness. As such, this research uses relevant literature in order to map out teachers' wholeness from the point of view of their thinking, lives, inner lives, calling, contemplative approaches, and pedagogy.

1.4.1 Teachers' Thinking

Researchers of teacher thinking strive to map the mental lives of teachers. Clark and Peterson's (1986) research on teacher thinking shows that teachers' personal values and beliefs affect their teaching and play an integral role in the development of pedagogy and practice. Clark and Peterson also commented on the difficulty of conducting research on teacher thinking due to the fact that teachers' thinking and their actions are confounded by the multiplicity of influences in their lives.

1.4.2 Teachers' Lives

The research on teachers' lives is situated within the framework of understanding curriculum as autobiographical/biographical text. Pinar et al. (1995) note that the sector of autobiographical and biographical research is comprised of four streams: teachers' collaborative autobiography (Butt and Raymond 1992), personal practical knowledge (Clandinin and Connelly 1987), teacher lore (Schubert and Ayers 1992), and studying teachers' lives (Goodson 1991). Pinar et al. (1995) explain that while

researching teachers' lore and personal practical knowledge, it is common to request that teachers report their experiences as an autobiography, as exhibited in Goodson's (1992) study of teachers' lives and Butt and Raymond's (1992) collaborative autobiography of teachers.

1.4.3 Teachers' Inner Lives

Parker J. Palmer is the founder of the Center for Courage & Renewal that offers *Courage to Teach* and *Courage to Lead* educational programs for the personal and professional renewal of public school teachers and leaders. In several of his works, Palmer (1983, 1998, 2000, 2004) presents a model for approaching one's soul or inner life. John P. Miller's research on holistic education and the inner life of teachers that spans over 30 years provides a foundation for a spiritual curriculum that nurtures the soul. J.P. Miller (1993, 1994, 2000, 2006) outlines a model for teachers to explore their inner lives. J.P. Miller (2006) highlights qualities such as wisdom, compassion, joy, awe and wonder, feeling whole, and having a sense of purpose as the outcome of timeless learning that impacts the inner life. In *Education and the Soul*, Miller explores the nature of the soul and how it could be incorporated into schools. Miller also discusses the curriculum needed for the inner life through techniques such as meditation, visualization, dreamwork, and autobiography. Most importantly, Miller also focuses on the need for the teachers to explore their inner lives for soulful learning to take place. Miller affirms that "the teacher's soul must be nourished if the student's soul is to develop… [and] there is nothing that our students desire from us than out attention, our authentic presence" (Miller 2000, p. 10).

1.4.4 Teachers' Vocation/Calling

The word *vocation* is rooted in the Latin for "voice," and Palmer (2000) stated that vocation is not an act of will but rather the calling that one hears. The listening of the authentic call comes from the voice within, the inner voice that connects to our true self (Palmer 1998). In researching the events in a teacher's life that have influenced his/her decision to become a teacher, I am relating it to their calling into the profession of teaching. Most work on vocation revolves around the point of view of theology (Placher 2005; Marshall 1996; Schuurman 2004; Smith-Moran 1997).

1.4.5 Teachers' Contemplative Practices/Approaches

Contemplative practice involves "the development of compassionate attention" (Miller 1994, p. 2). As such, contemplation involves the act of total attention, which is connected closely to the notion of "teaching presence." In contemplation, a phenomenon takes places where the boundary between the object and subject

disappears and as J.P. Miller (1994) explains, "in contemplation we tend to merge with the object… [or in other words] we become the object or the process that we are contemplating" (p. 3). This merging with the object is also known as the non-dualistic experience or the feeling of oneness. Being is also called the Self (Carl Jung), the Atman (Hinduism), Buddha-Nature (Buddhism), Inner-self (Thomas Merton) (Miller 1994).

1.4.6 Teachers' Pedagogy and Curriculum Design

In understanding curriculum as an institutional text, Pinar et al. (1995) explains that the art of teaching and learning forms a bridge between curriculum and teachers. The exploration of teachers' pedagogy in relation to their spirituality is an important aspect of my research. Jackson's (1968) study of the practice of teaching takes a neutral stand by not siding with either progressive or traditional positions and states that teachers need to have both conservative and liberal outlooks.

2 Methodology

This research utilized a phenomenological qualitative inquiry to explore the wholeness of teachers' teaching at a Krishnamurti school and to investigate the impact of Krishnamurti's philosophy on their lives and pedagogy. This qualitative inquiry is based on the participants' description of their wholeness using in-depth interviews. In this research, the phenomenon under study or consideration is teacher's wholeness. The influence of Krishnamurti's philosophy on the wholeness of teachers in his school – notably the Old Groove School – will be the first issue to be investigated, under the category of teachers' thinking. The other issues that will also be investigated are teachers' lives, teachers' inner lives, teachers' vocation, teachers' contemplative approaches, and teachers' pedagogy/curriculum design. As such, the phenomenon of teachers' wholeness will be investigated via the lens of teachers' thinking, lives, inner lives, vocation, contemplative approaches, and pedagogy/curriculum design.

2.1 Data Collection Methods

Data collection is an important process in qualitative research, in seeking to answer the research questions. In-depth interviewing was used as the method of collecting my data. Interviews were conducted for all six categories of questions with the four research participants. The first interview involved probing into the motivations and events in their lives that prompted participants to become teachers and to teach in a Krishnamurti school; the second interview focused on the aspects of their inner life

that nourish their wholeness and also the aspects of their inner lives that connect to their calling or vocation; the third interview focused on their contemplative practices and the aspects of Krishnamurti's philosophy that they used in shaping their curriculum design and pedagogy.

2.2 Participants

The participants were chosen from the Oak Grove School, one of the schools which Krishnamurti founded. A purposeful sampling strategy (Creswell 2007; Siedman 2006) was utilized to select four teachers from the school. This strategy was suitable because it allowed me to "purposefully" select participants who could provide useful and "rich" data in order to better understand the phenomenon under study.

The selection of suitable participants (teachers) is crucial in a phenomenological study. Before imposing any selection criteria, it is important to understand that the participants need to volunteer for this study and that they fully understand the purpose of this research (this task was completed in the first letter sent to the principal dated 26 May 2009).

The four participants who volunteered to take part in my research were Mary, Ecila, Neville, and Paul.

The summary below reflects the breakdown from the raw data to themes and findings:

(a) Eighteen hours of audio interview with four participants resulted in 233 pages of transcribed data.
(b) A total of 20 themes emerged from the 233 pages of transcribed data.
(c) A total of 58 findings were obtained from the 20 themes.

3 Themes, Findings, and Discussion

In this section, one theme from each category (teachers' thinking, teachers' lives, teachers' inner lives, teachers' vocation, teachers' contemplative practices, and teachers' pedagogy) and its respective finding will be presented.

3.1 Teachers' Thinking

Theme: Motivation to teach in a Krishnamurti school

Finding: Freedom to inquire and explore

Synopsis of finding:

The participants expressed their satisfaction with the environment at the Oak Grove School in terms of how Krishnamurti's philosophy is understood and how the philosophy plays a role in creating an environment free of fear and competition. The following quote from Ecila aptly captures this essence:

> Ecila: You know in a certain way there is a great responsibility in teaching here. I'm very responsible I feel, for creating an environment that doesn't have fear [and] that kids don't feel competitive, creating an environment where children can really be themselves and discover who they are. I wouldn't have been able to teach that was I in any other school. So there's a great deal of freedom in that and then there's a great deal of responsibility also because each child becomes your child.

3.2 Teachers' Lives

Theme: Events leading towards the teaching profession

Finding: Earliest recollection of wanting to be a teacher

Synopsis of finding:

Paul's working experience with the Laotian refugees gave birth to the notion of the importance of helping another person, and this was the first time Paul became aware of his inclination to become a teacher:

> Paul: I was doing that work with Laotian refugees and that's really where it first came to me. It was never an abstract idea for me, I didn't particularly like school, but this was before I had my Master's degree because there was ten years between B.A. and Master's for me, but I was standing up holding a phone book in front of that group of former monks and peasants from the hills in Laotian and I thought "good Lord, this is fun". Because it's useful too, you know, you really felt like you were doing something for these people, and I think that's where I first got the first inkling that there was something to giving back, you know.

3.3 Teachers' Inner Lives

Theme: Learning and educating oneself

Finding: When relationship acts as a mirror

Synopsis of finding:

Mary felt that she considers her students as being a mirror in which she sees her actions and behavior. It simply means that her interaction with her students revealed her deeper intentions:

> Mary: But much more profound really is the inner growth that takes place when you're faced with a mirror for yourself and children provide that I know parents know that. The child holds up a mirror to the parent and oh, did I really say that? Oh dear what does that mean and what does that mean for me and this child?

Theme: Inner life and timeless learning

Finding: Conditions for timeless learning

Synopsis of finding:

Without sensitivity, there's no joy and Paul stressed that without that joy, one cannot walk into a classroom and teach. We can see that Paul has really nurtured his sensitivity and considers joy as an important aspect of sensitivity; he questions the integrity of teachers who walk in a classroom without that sense of joy:

> Paul: But having said that, without that sensitivity there's no joy, and if you just imagine, if you don't have joy why would you go into a classroom? Honestly, seriously, ask yourself that question. Would you really walk into a classroom if you didn't know joy, for God's sake, how could you do that? And yet I used to do teacher observations and I used to walk in and you'd get these angry teachers, and these frustrated teachers, and you think "God, get out of here".

3.4 Teachers' Vocation/Calling

Theme: The understanding of calling or vocation

Finding: Discovering one's calling

Synopsis of finding:

Mary's soul was in joy after embarking into early childhood education and realized that teaching young children was her calling. As a metaphor, she referred to the field of early childhood as her playground, where she found total joy:

> Mary: Then as soon as I had children, discovered Early Childhood Education [and] it was a voice saying whoa, I don't ever want to leave this playground, this is where I belong, I am in joy. I mean really another one of our kindergarten teachers who came through with her child through our programs and was obviously was a gifted teacher but she didn't know it at the time but she said I just feel closest to God when I'm right here and she's not particularly religious but she used that word because she needed to express how profound it felt that she had suddenly discovered that she was a teacher and she should work with young children and she's right, she's amazing.

3.5 Teachers' Contemplative Approaches

Theme: Pedagogy and contemplative approach

Finding: Awareness of contemplative approaches on pedagogy

Synopsis of finding:

Embodying awareness is a lifetime work and being on that journey towards such embodiment affects the way Ecila teaches in the classroom. For some participants, this awareness that is connected to the contemplative approach is based on observing *what is* or observing their conditioning or their students' conditioned mind:

> Ecila: I think [being mindful is] the foundation of everything. Yes, or if they don't embody it yet, they're on their way to embody. And I know embodying it's a lifetime work, it's my lifetime work, but my lifetime work very much effects how I am in the classroom.

Neville feels that the practice of Yoga helps him to feel more relaxed physically and mentally:

> Neville: Yoga kind of just chills me out [or makes him more relax] a little bit and that relaxedness contributes both mentally and physically when I'm teaching.

3.6 Teachers' Pedagogy/Curriculum Design

Theme: Conveying the timeless is implicit

Finding: Nature as an implicit nurturer

Synopsis of finding:

Ecila intentionally takes her students to nature, and nature implicitly nurtures them. This implies that Ecila only brings the children to nature and nature nurtures the children just by being there:

> Ecila: I don't know that but I think that by intentionally, well of course you want intentionally, I intentionally want the children to be in nature as much as possible so that they have that feeling but I'm not doing anything, nature is.

Ecila only provides the environment for the students to feel the order and attention; it's implicit and it comes about naturally:

> Ecila: I want children to feel absolutely free to say whatever they want to say and have the kids feel an order comes within the group, that was disrespectful or that was rude or that hurt my feelings or these things. A certain order comes in the group when you have paid enough attention at the beginning of the year to these things and it's implicit but respect and giving another space and awareness to be who he is without judging first, that just naturally comes about. And I'm not doing anything except providing an environment, they're doing it.

4 Concluding Remarks

An original insight from this research is the formation of six categories (teachers' thinking, teachers' lives, teachers' inner lives, teachers' vocation, teachers' contemplative approaches, and teachers' pedagogy/curriculum design). The findings reveal the terrain of consciousness of the participants in relation to their wholeness.

This systematic study of Krishnamurti's educational philosophy that resulted in approaches that could encourage teachers to observe their conditioning in order to allow the flowering process to make them whole are the insights that this research brings to the field of Holistic Education.

Wholeness refers to the harmony between the body, mind, and spirit. When the body, mind, and spirit are in harmony, we can live to our fullest potential. If the body is not healthy, the mind and spirit cannot reach full potential; and this is true if any one of the three aspects of the body is not well. Therefore, the importance of

living a balanced life or living holistically has direct implications for our wholeness. Krishnamurti had been pointing towards this wholeness throughout his life. He obviously was not pointing directly towards the timeless qualities such as love, patience, compassion, etc., but towards the shadow or the conditioned mind. Krishnamurti felt that the timeless qualities (or what he calls the unknown) cannot be inquired directly, but the very inquiry into the fragmentation of our mind or the conditionings such as our sorrow, jealousy, anger, loneliness, etc., will automatically reveal the timeless or the unknown to us.

This empirical research study that investigated the wholeness of teachers in a Krishnamurti school has direct implications for teachers on their journey towards wholeness. Teachers' wholeness matters if we are interested in creating the conditions that would allow the flowering of students' wholeness. In other words, Whole Teacher Education is a needed and is undoubtedly an important element in realizing Whole Child Education. If the teachers are fragmented and are troubled in the body, mind, and spirit, how can they transform their students? By transform, I mean helping students to see their own conditioning. If one is fragmented, then one can perhaps follow the curriculum orientation of transmission and transaction but surely cannot engage in the transformational orientation as articulated in the work of Miller and Seller (1985). A teacher who is observing wholeness within needs to have a healthy body, mind, and spirit and must be able to engage in all three orientations: transmission, transaction, and, most importantly, transformation. In other words, a teacher who is flowering in wholeness, no matter what subject he or she is teaching, should strive to impact his/her students' lives through the use of curriculum and pedagogy that results in further inquiry on the subject. Teachers need to give deeper meaning to the subjects they are teaching, and this can only happen if they themselves are passionate about the subject matter. Therefore, to transform the world at large, we need to transform ourselves first. Without the inner transformation, the outer action becomes perverted, becomes an escape, and becomes selfish. With the inner transformation involving the integration of the body, mind, and spirit that flowers in wholeness, one's action becomes integrated, holistic, and sacred. As such, the journey of this research has been very meaningful for the well-being and health of my body, mind, and spirit. Perhaps, it was my own fragmentation that led me towards this research on wholeness, and in essence, this research chose me and not the other way around. My hope is that Krishnamurti's philosophy will find its way into the discourse of Teacher Development and Whole Teacher Education. The author's new published book titled *The Whole Teacher: Transformational Approaches for Awakening the Teacher Within* can be obtained via Amazon.com.

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Part II
Mobility and Diversity

Project-Based Learning for Building Work and Life Skills in Line with Taylor's Graduate Capabilities

Wee Jing Tee, Seng Yue Wong, and Pui Voon Lim

Abstract This research examined student experiences and learning outcomes in higher education with project-based learning (PBL) in order to help the students to acquire work and life skills with a case study of a successful PBL implementation in Taylor's University. The problem statement here is there is a gap between the learning outcomes at university and demands in industry. Thus, Taylor's University is redefining teaching and learning in higher education through implementation of blended learning and Taylor's Graduate Capabilities (TGC) in order to meet the ever-changing demands of industry, community and globalisation. TGC is an initiative that inculcates essential qualities in graduates for an advantage to acquire work and life skills in order to succeed in the working world. A case study on PBL implementation in line with TGC has been conducted for two semesters for Foundation in Computing students at School of Computing and IT, Taylor's University. In this study, the researchers discussed theoretical and design principles of PBL implementation and how information technologies and blended learning could potentially support to meet these principles. Quantitative and qualitative approaches were used as research methodologies, which included a learning satisfaction survey, interviews and classroom observations. The research findings provided insight into how faculty conceptualisation of PBL drove implementation and showed that PBL in higher education could contribute to effectiveness in students' learning of work and life skills.

Keywords Project-based learning • Work and life skills • Taylor's graduate capabilities

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1 Introduction

We live in a world where technological innovation is occurring at exponential speed and changes are inevitable in our daily lives. In higher education institution, educators are constantly on a quest to enact positive changes to the methodology of teaching and learning, in order to help the students to acquire necessary skills for work and life in the real-life scenarios. The problem statement here is there is a gap between the academic and industry, and educators are researching on identifying the best methodology of teaching and learning to ensure our students have the capacity to stay relevant in an ever-changing world with the right skill sets. Among other qualities, Taylor's Graduate Capabilities (TGC) has defined eight key qualities to enable Taylor's graduate to have the capacity to meet the ever-changing demands of industry, community and globalisation. The hypothesis of this study is with the right implementation of PBL in line with TGC, students can successfully acquire the necessary work and life skills. In this study, we took a leap of faith in our teaching by redefining what it means to teach and learn using project-based learning in line with TGC as an instructional methodology in our teaching courses.

2 Literature Review

Project-based learning (PBL) is a specialised approach under the larger umbrella of problem-based learning. PBL is defined as "a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed projects and tasks" (Markham et al. 2003). PBL is an inquiry-based instructional approach and learner-centred learning environment that focus on the students' learning curve on the use of disciplinary concepts and knowledge, experiences and technologies to perform complex problem-solving skills in order to solve real-world problems (Markham et al. 2003; Krajcik and Blumenfeld 2006). Studies (Grant and Branch 2005; Thompson and Beak 2007) show that PBL engages students in continuous and collaborative learning which allows students to apply their innovative ideas while engaging in real-world activities by investigating problems, discussing ideas and developing solutions. Study (Thomas 2000) shows that there are five features of PBL: curriculum based, student driven, constructive investigations, autonomy and realism.

PBL is one of the student-centred methodologies that are highly effective in achieving learning outcomes. PBL provides students with constructive learning environment where students can develop their creativity and solve complex problems they face in real-life scenarios. On top of this, PBL supports students in acquiring knowledge and skills and motivates students to perform more original learning activities to construct new knowledge and solution (Chen 2004). Due to the above characteristics, PBL provides many benefits to students and is gradually becoming

a trend in the higher education, especially in the field of science and technology. Recent studies (Lehmann et al. 2008; Alptekin et al. 2005; Nandikolla et al. 2008) also show that PBL is one of the most effective tools used in engineering education and is gradually becoming the popular pedagogical model for teaching engineering design to transform teaching methodology to address more complex real-world problems.

PBL is a holistic approach that bridges the gap between the theoretical knowledge and the relevance of the knowledge in the real world. As such, the challenges of implementing PBL in higher education should not be the barrier for not exploring this holistic approach. Study (Railsback et al. 2012) shows that the knowledge and skills of the lecturers in implementing PBL in teaching and learning are important to ensure the successful outcome. Lecturers can minimise the difficulties in implementing PBL if they attend the relevant trainings and are equipped with the necessary knowledge and skills. With proper coaching and mentoring from the lecturers, students can achieve their fullest potential in PBL.

With the emerging trend of blended learning which combines traditional face-to-face teaching with online learning, this constructive learning environment provides great flexibility and adaptability in implementing PBL in higher education. During the classes, various learning activities can be designed and implemented to support the learning outcomes of PBL. With the innovative educational technology, communications between students and lecturers can be enhanced and collaborative effort to complex problem-solving can be achieved in a ubiquitous environment at anytime and anywhere. These benefits will further improve the learning outcomes of PBL. To develop PBL online lessons, there are various tools that are useful for online teaching and learning. Lecturers can integrate synchronous and asynchronous activities in an online lesson. These online lessons aim to ensure students know the essentials of critical thinking and complex problem-solving and understand various research methodologies.

3 Research Framework

Taylor's University is redefining teaching and learning in higher education through implementation of blended learning and Taylor's Graduate Capabilities (TGC) in order to meet the ever-changing demands of industry, community and globalisation. TGC is an initiative that inculcates essential qualities in graduates for an advantage to acquire work and life skills in order to succeed in the working world. There are eight TGC: discipline-specific knowledge, lifelong learning, thinking and problem-solving skills, communication skills, interpersonal skills, intrapersonal skills, citizenship and global perspectives and digital literacy.

In TGC framework, each capability is further defined in details. Discipline-specific knowledge is defined as solid foundational knowledge in relevant subjects and understanding of ethical issues in the context of the field of study. Lifelong learning is defined as the ability to locate, extract, synthesise and utilise information

effectively and the ability to relate learned knowledge to everyday life. Thinking and problem-solving skills are defined as the ability to think critically and creatively and the ability to define and analyse problems to arrive at effective solutions. Communication skills are defined as the capabilities to communicate appropriately in various settings and modes. Interpersonal skills are the abilities to manage oneself and be self-reliant, reflect on one's actions and learning and embody Taylor's core values. There are six Taylor's core values: we believe in respecting and caring for each other; we believe in being dedicated to a culture of excellence; we believe in openness in communication; we believe in acting with integrity; we believe in being passionate in what we do; and we believe in creating enjoyable environments. Citizenship and global perspectives are defined as the capability to be aware of and form opinions from diverse perspectives. Digital literacy is defined as the understanding of the value of civic responsibility and community engagement. Digital literacy is defined as the capability to effectively use Information and Communications Technology (ICT) and related technologies.

At Taylor's University, lecturers in each school are responsible to embed TGC in their teaching and learning activities. At programme and module levels, lecturers will implement TGC through curricular design, mapping learning outcomes in relation to TGC, assessment of TGC achievement and tracking student learning activities and development. In order to align our strategic plan and curricular design so that it is always relevant, current and grounded in industry expectations, our academics also get valuable real-world input from employers in our Industry Advisory Panel, as well as our alumni network and business partners from varied industries. In this regard, lecturers at Taylor's School of Computing and IT (SoCIT) organise expert forums, guest lectures from industry partners, workshops, field trips and other industry-relevant activities. With all the real-world input and feedback, we then integrate it into our PBL assignments, lecture, tutorial and practical lessons in classes.

In this study, we have designed and implemented PBL in our module "Introduction to Computing" in line with TGC for two semesters for Foundation in Computing (FIC) students at SoCIT. In our PBL implementation, we gave our students a 20 % group PBL assignment entitled "A world where technology helps solve the toughest problems". In this assignment, students are expected to come out with an innovative and feasible solution to solve the tough problems and issues in line with the Millennium Development Goals (MDG) of United Nations (UN). The MDG by UN were agreed upon by 189 nations around the world, with eight goals encompass universally accepted human rights such as freedom from hunger, the right to basic education, the right to health and a responsibility to future generations. This topic is in line with the Microsoft Imagine Cup Competition, which is a world-class competition for students from higher educational institutions around the world to participate. As such, by integrating the same topic and scope in PBL assignment, we are also preparing our students to join the competition.

At the end of PBL assignment, students need to submit a full report and a prototype on their proposed solution and do a presentation. During the assessment, the lecturers will assess the written report and oral presentation of the students. The

marking scheme of PBL assignment is based on industry standard and world-class competition, which comprises of problem definition, solution and innovation, technical architecture and feasibility and business viability and value proposition. During oral presentation by students, the components of assessment are language fluency and grammatical accuracy, pronunciation and intonation, expression and delivery techniques. Also, during oral presentation, students are expected to do a real-world pitching in professional manners in order to convince the lecturers and senior students on the values of their proposed solution. The best three teams from the PBL assignment will be selected and continuous coaching will be given by lecturers and industry mentors in order to polish up their proposed solution to enter into world-class competitions or start-up funding by venture capitals.

4 Research Method

The research methods used were quantitative and qualitative approaches. For quantitative approach, data was collected from learning satisfaction survey from all students in the classes. As for qualitative approach, we conducted interviews with all students in the classes and also carried out classroom observations. We conducted this study in two semesters, i.e. semester 1, year 2013, and semester 1, year 2014. For semester 1 2013, which was from July 2013 to December 2013, there were a total of 14 students enrolled in the course "Introduction to Computing" for Foundation in Computing (FIC) programmes at SoCIT, Taylor's University. In the class for semester 1 2013, the 14 students were divided into 3 groups to carry out PBL assignment. And for semester 1 2014, which was from February 2014 to July 2014, there were a total of 15 students enrolled in the course "Introduction to Computing" for FIC programmes at SoCIT, Taylor's University. In the class for semester 1 2014, the 15 students were divided into 3 groups to carry out PBL assignment. This course had three components, i.e. lecture, tutorial and practical.

To enhance the implementation of PBL in order to achieve TGC, we also implemented the course using a blended learning environment with the support of educational technology. During lecture sessions, Taylor's Integrated Moodle e-Learning System (TIMeS) as the learning management system was used for managing lecture slides, tutorial questions, practical exercises, online forums and submission of assignments. During tutorial sessions, videos as teaching and learning element were used to showcase the related course contents in a multimedia context to enhance understanding. During tutorial sessions, various learning activities related to PBL and TGC were also conducted using e-learning tools, like wall with Padlet, Socrative real-time response system, Nearpod virtual classroom and others. During tutorial and practical sessions, Facebook group as social learning platform was used for collaborative learning, online discussion and sharing of learning resources among students.

5 Results and Discussion

The findings of this study showed that PBL in higher education could contribute to effectiveness in students' learning of work and life skills, in line with TGC. Learning satisfaction survey from consecutive two semesters indicated encouraging feedbacks from students regarding the learning outcomes of PBL assignment in order to help the students to acquire necessary skills for work and life in the real-life scenarios. The feedbacks are shown in Table 1.

From quantitative aspect, the overall feedbacks from students in the classes show that the learning outcomes of PBL assignment in line of TGC have been achieved. 93.10 % of the students strongly agreed that doing the PBL assignment in group enhanced their effectiveness in learning. 89.65 % of the students strongly agreed that doing the PBL assignment in group help them to acquire work and life skills. 96.55 % of the students strongly agreed that TGC is an initiative that inculcates essential qualities in graduates for an advantage to acquire work and life skills in order to succeed in the working world. In terms of the achievement of the specified

Table 1 Feedbacks from learning satisfaction survey

No.	Feedback from students in the class	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
1.	In your opinion, doing the PBL assignment in group enhanced your effectiveness in learning	93.10	3.45	3.45	0.00	0.00
2.	In your opinion, doing the PBL assignment in group help you to acquire work and life skills	89.65	6.90	3.45	0.00	0.00
3.	You have learnt discipline-specific knowledge	86.21	10.34	3.45	0.00	0.00
4.	You have learnt lifelong learning	82.76	10.34	6.90	0.00	0.00
5.	You have learnt thinking and problem-solving skills	82.76	17.24	0.00	0.00	0.00
6.	You have learnt communication skills	82.76	13.79	3.45	0.00	0.00
7.	You have learnt interpersonal skills	79.31	17.24	3.45	0.00	0.00
8.	You have learnt intrapersonal skills	75.86	17.24	6.90	0.00	0.00
9.	You have learnt citizenship and global perspectives	79.31	17.24	3.45	0.00	0.00
10.	You have learnt digital literacy	75.86	20.69	3.45	0.00	0.00
11.	In your opinion, TGC is an initiative that inculcates essential qualities in graduates for an advantage to acquire work and life skills in order to succeed in the working world	96.55	3.45	0.00	0.00	0.00

eight key TGC qualities, 86.21 % of the students strongly agreed that they have learnt discipline-specific knowledge. 82.76 % of the students strongly agreed that they have learnt lifelong learning. 82.76 % of the students strongly agreed that they have learnt thinking and problem-solving skills. 82.76 % of the students strongly agreed that they have learnt communication skills. 79.31 % of the students strongly agreed that they have learnt interpersonal skills. 75.86 % of the students strongly agreed that they have learnt intrapersonal skills. 79.31 % of the students strongly agreed that they have learnt citizenship and global perspectives. 75.86 % of the students strongly agreed that they have learnt digital literacy. In summary, the finding of this study shows that the right implementation of PBL could contribute to effectiveness in students' learning of work and life skills in line with TGC.

From qualitative aspect, data from interview with students showed that one of the challenges of working in the group was to get full commitment from every member in the group. Lecturers had taken countermeasure in this aspect by implementing two assessment methods – individual and group. Individual assessment was based on peer review on individual student level of commitment, collaboration and attitude. Group assessment was by lecturers based on the end results and outcomes of the successfully completed PBL assignment. Continuous discussion and reflection were also conducted between lecturers and students to ensure problems that arise were solved in the early stage of the PBL assignment.

The responses from the interview also showed that the students enjoyed in getting together to work on their PBL project. They were motivated by the peer and lecturers to do their best. This was noted when asked to give comments regarding overall learning experience of PBL assignment. All of them gave a positive response. A majority of the groups felt proud of their work and felt that the learning experience was very good, as they were aware that in the working world, they will be handling big projects and collaborating with various people. Some students mentioned that leadership, project management skills and time management were among the important skills they needed to ensure success of the PBL assignment.

The data collected from lecturers' observation showed that the students were highly engaged in their learning process during the classes. Our observation also showed that PBL assignment motivates the students and improves the students' thinking and problem-solving skills. This was supported by the fact that less motivated students, who had less engagement in the beginning, had showed a significant improvement in their attitude and commitment after they got involved in the process of doing the PBL assignment. Discussion and collaborative learning among students which frequently happened during the process of completing the PBL assignment also contributed to the motivation and achievement of the students.

During the interview, students were asked while doing the PBL assignment whether they had acquired relevant work and life skills in line with the TGC, all of them agreed that to a certain level, they have successfully learnt and acquired the relevant capabilities and competencies in order to prepare themselves to become outstanding employable university graduates. The responses from the interview also showed that the students agreed that TGC is an initiative that inculcates essential qualities in graduates for an advantage to acquire work and life skills in order to

succeed in the working world. The students also indicated that they had gained more confidence in themselves throughout the learning process of PBL assignment.

6 Conclusion and Future Study

In this study, we examined student experiences and learning outcomes in higher education with PBL in line with TGC in order to help the students to acquire work and life skills with a case study of a successful PBL implementation at SoCIT, Taylor's University. The contribution of this study is that the results provide insight into how faculty conceptualisation of PBL drives implementation and show that PBL in higher education could contribute to effectiveness in students' learning of work and life skills. Specifically in SoCIT, Taylor's University, the finding of this study show that PBL is indeed a student-centred methodology that is highly effective in achieving learning outcomes in line with TGC. This finding can be used to improve the teaching and learning experience. The limitation of this study is the students are all from foundation level at SoCIT, Taylor's University. As a result, further study will be carried out with other students from degree level. With the exponential growth of educational technology, the best methodology of teaching and learning to help our students to have the capacity to stay relevant in an ever-changing world with the right skill sets remains an area of further research.

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Inside and Out: Malaysian and Non-Malaysian Tropes, the Comparative Approach and the Works of Tunku Halim and James Wan

U-minh Mahinda Ho

Abstract Intended as a showcase for contemporary achievements in literature, the University Core Module on Malaysian Literature in English examines Malaysian prose writing in terms of its social, cultural, political and religious contexts. The following paper examines the Comparative approach to literature – what Talvet defines as "the reading and study of literary works and phenomena in contexts transcending… a determined national-linguistic area of culture" (5) – and the benefits obtained by examining Malaysian tropes, themes and techniques by means of comparison with similar works from abroad. Popular fiction writer Tunku Halim Tunku Abdullah's *Dark Demon Rising* (1997) is examined alongside James Wan's American horror film *The Conjuring* (2013). The intention is not to hold Malaysian works against a perceived Western "norm" of excellence, the aspect of neocolonialism that Bhabha calls "cultural relativism" (expounded in Moore-Gilbert, Postcolonial theory: contexts, practices, politics. Verso, London. Print, p 125, 1997), but rather to highlight the benefits derived from expanding the material studied in Malaysian Literature in English to include works by foreign writers and artists. It is arguable that the Malaysian canon is, today, rich and diverse enough to fuel this practice of juxtaposition and comparison without recourse to foreign works; however, the author maintains that certain deconstructive advantages may be derived from a willingness to examine Malaysian literature in light of the global canon.

Keywords Malaysian Literature • Comparative • Tunku Halim • James Wan

A familiar proverb, wrongly attributed to Aristotle, asserts that "The worst form of inequality is to try to make unequal things equal".

What follows is not a treatise on equality or even a treatise on misattributed quotes. However uncertain the proverb's source, its warning seems relevant to our

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current work: how, in attempting to further one's understanding of a literary text by means of *comparison*, there lies the danger of misreading its worth entirely.

The technique in question, of course, is that of Comparative Literature – what Childs and Fowler succinctly describe as the practice where "a work of literature yields a richer significance when placed alongside another, each serving as a way of talking about the other" (29). It is through comparison and contrast that the attributes of a given text are brought into high relief and appreciated. As the centuries-old practice of Comparative Literature – its modern name originating from the *Course de literature compare* of 1816 and Matthew Arnold's usage of the term in 1848 (Das 2009, 7) – inevitably brings different languages and cultures into proximity, there arises with it the question of relative national value and the accompanying concerns of nationalism.

Cue the European Age of Imperialism, national independence, postcolonialism and its flowering literature and the cultural hegemony now perceived as the evil follow-up of colonial rule. To regard oneself in light of the First World's norms is a postcolonial *faux pas* – deferring, as it does, to the values and norms of the former colonial masters. (This rule is naturally void if you happen to claim First World citizenship yourself; only the former subjects of Empire need apply.) The very basis of Comparative study becomes a potential hotbed of politics: to whom might a Malaysian author be compared? For what reason? Whose standards of literary excellence should form the basis of assessment, if assessment is the goal? For whom is the assessment implemented and by whom? In juxtaposing the canon of First World and Third World – an established practice in Comparative Literature – is the perceived "internationalist" attitude of the comparison (Childs and Fowler 2006, 30) simply another means of masking the First World's bourgeois appropriation of a Third World resource to feed its academic-cum-literary market, as claimed by Marx and Engels?

Hasn't the First World glorified its literature enough? Can't we, of the Third World, simply appreciate ourselves without dragging their hegemonic culture machine into the picture?

Valid concerns, if not entirely within the scope of the current study to address. A certain degree of touchiness is understandable, given the not-so-distant Age of Imperialism which, no longer prevalent as every intellectual's favourite bugbear, has nevertheless consigned a number of important artefacts that may (or may not) be advantageous to a Malaysian reader.

First: the retention of English as the Malaysian *lingua franca* – if not internally, then externally as the language of international relations. Second: the continued recognition and admiration of First World literary awards such as the Man Booker Prize and the Whitbread/Costa Book Award. (Malaysian authors linked to such major awards are typically rewarded with some degree of media fanfare; notable recent examples include Tan Twan Eng and Tash Aw.) Third: the continued popularity of First World literature – fiction more than drama or poetry, perhaps – that one may perceive simply by walking into any popular Malaysian bookstore.

This modest list of observable phenomena indicates, at least, that the Malaysian literary scene cannot justly be regarded in isolation from the world's writing – any

more than the authors create their fiction in an intertextual vacuum. Tan Twan Eng cites the prose of Salman Rushdie and Kazuo Ishiguro as inspirational sources (Bakar et al. 2007, 33); Tash Aw names Herman Melville and William Faulkner (Miller 2013, 10–11). It appears that the work of Malaysian authors, then, requires a suitably cosmopolitan viewpoint before justice can be done to them; otherwise, whole facets of the authors' cultural paradigm may fall beneath the radar.

This is not to say, of course, that Malaysian literature should be compared to foreign works arbitrarily. Any exercise in comparison and contrast requires a common baseline: a shared quality, even if it manifests as a *divergence* in that quality, which warrants the comparison. The subjects in question require "enough common points for meaningful discussion", as Connelly describes (2013, 301) – implying that if a Malaysian text is to be read comparatively against a foreign one, the purpose of that comparison must never be less than the improved appreciation of both texts and not merely the creation of meaningless lists of "similarities" and "differences".

The best means to illustrate this may be a practical reading, which follows.

1 A Question of Reception

One curious aspect of postcolonial literature in English is the matter of target readership: to whom are such works addressed? Malaysian fiction, both commercial and literary, is by definition produced by *Malaysian authors*. It is worth acknowledging the difference between this and fiction with a Malaysian backdrop authored by non-Malaysians. The latter includes such stalwarts of the Western literary canon as Joseph Conrad, Anthony Burgess and Somerset Maugham – and while their literary merits are unquestioned, care must be taken to avoid the misconception of "World Literature" as described by Clements (30):

> The fraudulent claims of American "world literature" textbooks have been recently exposed by Mrs. Crown, who sampled sixteen such texts and found that pages devoted to Asian literature ranged from .02 percent to 14.7 percent; these percentages included such Asians [sic] as Rudyard Kipling and Pearl Buck!

For the current study, then, it is only the writing of Malaysian authors that counts as Malaysian fiction. Written in English, one assumes that the readership would consist of Malaysians fluent in English or possessing at least the receptive skill to read and comprehend in English. This assumption leads to further assumptions: what readership class (financial, academic, etc.) would possess such a skill? How might the authors of Malaysian fiction in English pitch their in-text values and assumptions to appeal to such a readership?

Furthermore, one may assume that the highest accolade a Malaysian novel in English may receive is to be recognised by a First World readership – a shocking statement in post-Imperial times, perhaps, but practical if one recalls how winning the Man Booker Prize or Whitbread/Costa Book Award can affect any given author's

publicity and sales. Should appealing to a First World audience, then, be a priority for Malaysian authors?

On the subject of Magic Realism, Durix writes:

> A number of post-colonial novelists have felt the need to alternate action and commentaries in which a narrator, who stands outside the story, fills in information about the context or the background, which some readers might miss because of their ignorance of the world evoked. The narrator thus becomes a specialist adding to the reader's experience. This attitude is particularly frequent when the reader and writer belong to different cultures. (70–71)

Here, Durix is observing the postcolonial writer's penchant for explaining his or her culture to a First World audience: an audience unfamiliar with Third World norms and experiences, in need of clarification before the plot can advance. Such a practice is evident in Tunku Halim's *Dark Demon Rising*: the first-person narrator and protagonist, Shazral, could almost be designer made for such a role.

Ignorant of his culture, disdainful of Malay superstitions and "old wives' tales" (Tunku Halim 1997, 100), Shazral's initial dilemma is to overcome his contempt for the knowledge his father offers him and to investigate the world of Malay demons and spells he has resolutely ignored for 9 years. Such a protagonist grants a narrative advantage: he functions as a guide for First World readers who, presumably, are just as ignorant of "the context or the background" as himself. Shazral's journey mirrors the First World reader's discovery of Malay magic, as the plot unfolds – a parallel that additionally serves to enhance reader empathy with the character.

Was the novel intended for a First World audience? Short of an interview with the author and a sustained investigation of the publisher's distribution scheme, neither of which was conducted for the current work, the only evidence lies in the novel's narrative strategy. And its narrative strategy implies that there is, in fact, no special reason why the novel should be regarded as an offering to the First World market. Shazral may function as a guide to readers unfamiliar with "the context or the background", as Durix describes, but this function is useful both to foreign *and* Malaysian audiences. Multiracial and multigenerational, Tunku Halim's Malaysian readership is diverse – enough so that a large percentage would be unfamiliar with the world of Malay demons and spells anyway.

In effect, Tunku Halim's novel serves to introduce Malaysian culture to Malaysian audiences. Additionally, it may introduce Malaysian culture to a First World audience – but this does not imply that the novel was written for a First World readership.

2 Fiction as Education

Viewed in this manner, *Dark Demon Rising* possesses an educational quality that one does not commonly associate with commercial fiction, i.e. fiction that subscribes to a formula for the sole purpose of entertainment. What sets Tunku Halim's novel apart from, say, Stephen King's *Carrie* or *The Shining* is its inclusion of what

may be called "authentic myth": customs and beliefs that did not spring entirely from the author's imagination, but which were adopted from real-world cultural practices and used as an element of fiction.

One prominent example might be the eponymous "dark demon", who poses as the seductive Minah. On revealing her true form, Minah is described thus:

> The neck severed from her body!… Then the head started rising, revealing the stuff of a thousand nightmares… its bloody worm-like entrails spilled hotly out of its limp carcass, flopping out the neck – dangling itself before me, moist and slimy.... Head and guts floated in the air – lifting ten feet above. (Tunku Halim 1997, 143)

Hyperbole aside, Malaysian readers may recognise the *hantu penanggal*, though its proper zoological name is never used in text. From an infinite number of possibilities, Tunku Halim chose a culturally authentic species of ghost as his antagonist. A lame imagination is obviously not the cause, so another reason informs the author's choice.

That reason, perhaps, is the desire to *educate* his readers – if not quite to educate, then to record for posterity elements of Malay culture. This latter motive figures as a long-standing tradition in Literature per se. (As a quick reference, a selection of English examples might include George Eliot's *Middlemarch*, depicting the provincial English Midlands of the 1830s; Laurie Lee's *Cider with Rosie* and the Cotswolds one century later; and Barry Hines's *A Kestrel for a Knave* with its depiction of working-class Barnsley in the 1960s. Fictional elements aside, all three novels have been hailed as valuable depictions of worlds that swiftly passed away in the rapidly changing nineteenth and twentieth centuries. In effect, despite its fictional premise, each novel serves as a recording of social experience for future readers, thanks to its author's realist approach.)

Tunku Halim includes the *hantu penanggal*, instead of creating his own original monster in the style of H.P. Lovecraft, because the *hantu penanggal* is a figure from authentic Malay myth – and he wishes to incorporate authentic Malay myth in his work, either to educate readers on a little-known part of the Malay psyche or to record that such beliefs exist.

At this point, it is worth noting that the above authorial motives – the desire to educate readers and create a textual record of authentic cultural experience – may likewise be perceived in James Wan's *The Conjuring*. Based on a "true story" (according to the film's producers), *The Conjuring* portrays an American family's experience with a malevolent spirit, the possession and eventual exorcism of the family matriarch Carolyn Perron.

The film attempts to portray the supernatural in structured, logical terms. (Sceptics of the supernatural have taken issue with this apparently cunning habit of mystics and New Age practitioners borrowing the "credibility" of science by cloaking their activities in the jargon and faux logic of science and empiricism – see, e.g. Carl Sagan's *The Demon-Haunted World: Science as a Candle in the Dark*.) It is not the purpose of the current study to pursue the matter one way or the other, but only to highlight Wan's inclusion of this approach to the supernatural in his film.

This begins at the outset, with the Warrens' study of the "Annabelle case" and the explanation they provide their clients:

> ED: Now, firstly, there's no such thing as Annabelle, and there never was. (04:03)
> LORRAINE: Ghosts don't possess such power.

Asked to elaborate on the nature of an "inhuman spirit", Ed continues:

> ED: It's something that's never walked the earth in human form. It's something demonic (04:23)… Demonic spirits don't possess things, they possess people. (04:40)

Wan's portrayal of the Warrens' field of research is apparent: rather than preserve the mystique of spiritual knowledge, the Warrens' intention is always to spread their understanding of demonology. In terms of stagecraft, this gives an impression of modesty and credibility on the part of the characters; in terms of its nondramatic function, one wonders if the film was intended, additionally, as a medium for educating non-psychic viewers on the nature of spirits and demons.

It is difficult to determine Wan's personal views on the matter, but it is worth considering that Ed and Lorraine Warren are, or were, practising demonologists with an existing media presence prior to the film. Their non-fiction publications on the subject include *The Haunted: The True Story of One Family's Nightmare* (1988), *Ghost Hunters: True Stories from the World's Most Famous Demonologists* (1989) and, most recently, *Ghost Tracks* (2004). One may of course regard *The Conjuring* as a cynical exercise in self-aggrandizing or a sincere attempt to educate cynical audiences on supernatural matters.

The educational aspect is foregrounded, additionally, by the repeated portrayal of the Warrens delivering varsity-style lectures on the supernatural: first at an unnamed but prestigious-looking lecture theatre (04:55) and then at Massachusetts Western University in Wakefield (43:17). The second lecture includes the following informative, almost academic, overview of ghostly activity:

> ED: Fear is defined as a feeling of agitation and anxiety caused by the presence or imminence of danger. Whether it's a ghost, a spirit or an entity, they all feed on it.... Which brings us to the three stages of demonic activity: infestation, oppression and possession. Now, infestation: that's the whispering, the footsteps, the feeling of another presence… which ultimately grows into oppression, the second stage. Now this is where the victim, and it's usually the one who's the most psychologically vulnerable, is targeted specifically by an external force. Breaks the victim down. Crushes their will. And, once in a weakened state, leads them to the third and final stage: possession.

Here, one may begin to perceive the value in reading *Dark Demon Rising* comparatively against *The Conjuring*. Both works have an educational aspect with regard to their authors' intentions: a desire to record for the edification of future reader's knowledge that may otherwise remain obscure. There are vast differences between them, of course – not least of which is the culture (Malay and North American) that provides the backdrop for the stories – but this contrast can easily be appropriated as a pedagogic device. Students may be asked to consider what the authors wish to convey and how their intentions differ. This consideration of difference alone may extend one's comprehension of a Malaysian author's work: the very reason for examining Malaysian Literature in English.

3 Topics for Class Discussion

Apart from the aforementioned focus on education, and the recording of cultural beliefs for posterity, other topics for discussion may include the following:

1. *Secular success opposed to the spiritual life*. Tunku Halim's protagonist Shazral abandons his career as a city lawyer and remains in his village to fill his father's role of spiritual protector: "This life I lead, in the footsteps of my father, and my ancestors before him. The magic, the *ilmu*, the demons, they are all real, for otherwise my life would be meaningless" (Tunku Halim 1997, 226). The Warrens have a surprisingly easy time convincing people of the supernatural's existence in *The Conjuring*, but they do have to contend with the initial ignorance of the uninformed and the avoidance of prayer as a means of self-protection by their clients.
2. *Filial piety*. Not an issue in *The Conjuring*, unless one were to interpret Bathsheba's unnatural lack of regard for her child as the absence of its opposite, parental love. Filial piety is a major concern throughout *Dark Demon Rising*.
3. *First World science opposed to Third World magic*. This issue presents an opportunity for the reading of Tunku Halim's novel in light of postcolonial literary theory: in particular, the clash between First and Third World sensibilities. Given the conflict between Western scientific rationality and Eastern superstition – an instance of the "binary opposition" addressed by postcolonial literary theorists (see, e.g. Durix 1998, 61) – the tension between Shazral's original scepticism and the confirmed existence of demons may be read as a metonym of the relations between First World and Third World. Tunku Halim appears to foreground this relationship by making a First World native (in this case an Australian), Professor Cummins, journey to Shazral's village to elicit information on "Demons and Vampires in Malay Culture" (Tunku Halim 1997, 9). The Professor, significantly, leaves at the novel's conclusion without affirming the truth of Shazral's story (ibid 227); First World scepticism remains intact. With regard to *The Conjuring*, the tension between belief and disbelief occurs not between First World and Third World but between modern, secular North American society and the spiritual authority of the Vatican (the Warrens being Roman Catholic).
4. *The colonial and postcolonial*. As an extension of the conflict between First World science and Third World magic, it is also evident that a number of Malaysian characters have become acculturated to the former. Apart from Shazral himself, who initially rejects the sum of his father's teaching (literally referred to as his *pusaka* or inheritance [ibid 99]), there is also the Malaysian medical doctor who fails to cure the demonically inflicted Zak (ibid 119) and the decidedly materialistic Rama Das who falls prey to the demon (ibid 193). It is worth noting that this rejection of Third World myths (the "inheritance") by Third World natives would likely never have occurred without First World intervention during the Age of Imperialism.
5. *The horror genre*. Yet another example of the latter-day effects of Imperialism is the very existence of Tunku Halim's novel: written in English and subscribing to

the Western horror genre. It may be worth indicating to students how *Dark Demon Rising* does, or does not, follow the set formulas and tropes of the genre and identify similar qualities in *The Conjuring*. Tunku Halim's adherence to a Western form is not "derivative imitation" but "creative appropriation", as Cohen describes (7).

6. *Religion*. Both Tunku Halim and James Wan take a similar approach to religion in their respective works. Here, religion functions as the solution for demonic trouble, and its authenticity is taken for granted in the same way that demons and spells are confirmed to exist. While Shazral's power initially seems to be derived from his "inherited spirit" and magical incantations, it is the Holy Word (presumably the name of God) that finally kills the demon (ibid 217). Ed Warren, similarly, requires the Vatican's approval before he can engage an exorcist (though he is eventually forced to conduct an exorcism himself).
7. *Use and abuse of esoteric knowledge*. Magic is abused, or used constructively, in both works. Minah's henchmen obey her orders in return for burglary and seduction spells (ibid 191), and one of Shazral's deepest regrets was his early misuse of magic in an attempt to win a boat race – culminating in the death of his friend Affendi. Esoteric knowledge is similarly abused by the Satan-worshipping Bathsheba, who eventually becomes demonic.
8. *The Madonna-whore complex*. An interesting consequence of Shazral's life experiences is the apparent demarcation of his female companions into saints or monsters, with little in between. Minah is revealed as the "dark demon" in human form, while the pristine Roslyah is her diametric opposite. *The Conjuring* unifies the extremes in the possession of Carolyn Perron, who is altered from a loving parent to one capable of filicide, and back again.

4 Conclusion

While it is recognised that the primary aim of Malaysian Literature in English as a University Core Module is to promote Malaysian literary achievements among tertiary-level scholars, it is hoped that the partial inclusion of non-Malaysian works in the syllabus will be recognised as a beneficial addition. Comparison and contrast is an effective pedagogical means of improving one's analysis of a given text. It is true that the Malaysian literary canon is sufficiently diverse for this to be conducted without recourse to foreign writing; it should be recalled, however, that a purely Malaysian selection of novels, drama and poetry would prevent an informed understanding of Malaysia's place in world literature – how Malaysian works rank in comparison to the rest. Clements admires the crossing of media boundaries, including those that exist between literature and cinema (183); the same may be said for the boundaries of commercial or popular work in contrast to serious or literary fiction.

The strength of the Comparative approach lies in the crossing of such boundaries, for "it provides a method of broadening one's perspective in the approach to

single works of literature – a way of looking beyond the narrow boundaries of national frontiers in order to discern trends and movements in various national cultures…" (Aldridge, qtd in Clements 1978, 5). And it was Goethe (qtd in Cohen 1989, 4) who promoted this approach "on the grounds that contact with foreign literatures brings vitality to one's national literature while fostering international understanding and toleration".

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A Sociocultural Perspective of Factors Influencing Academic Writing from School to Postsecondary Education

Lai Fong Lee, Gurnam Kaur Sidhu, and Yuen Fook Chan

Abstract This study examined the experience of academic writing of English as a second language (ESL) students in postsecondary education by examining their writing transition from secondary school to postsecondary level in order to obtain a rich picture. A sociocultural approach was used to look into students' beliefs about writing, expectations of writing and desire for self-expression in writing as they moved from school to postsecondary education. The instruments used in this study were interviews, personal narratives and students' essays. The findings depicted that students' academic writing was impacted by students' histories, experiences and participation in the writing community which were intertwined with individual, institutional and societal factors. This study has implications for teaching and learning of academic writing, i.e. the impact of sociocultural factors, students' personal histories, experience and intent participation on academic writing should not be underestimated.

Keywords Academic writing • School • Postsecondary education • Sociocultural theory

1 Introduction

Writing, a dominant language skill, is important to students in learning and acquisition of knowledge. Moreover, writing competence has been linked to communicative excellence, a much sought-after attribute among graduates in the twenty-first century. Baker (2011, 2013) stresses that for students to be successful in university, they need good writing skill. Specifically, writing plays an important role in assessment, learning and entry into particular disciplinary communities in higher education (Coffin et al. 2003). In line with this, with the increasing enrolment of students

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in higher education, students' writing at postsecondary level needs to be understood from a wider perspective to empower them as writers.

Research in writing in university has mainly focused on discourse, development of ideas, cohesive devices, text type and genres (Bacha 2002; Ting and Tee 2008), although cultural, contextual, institutional, social and individual factors have also been investigated (Fitzgerald 2006; Preto-Bay 2004; Bartlett 2005; Hyland 2002). Hyland (2002) believes that there should be acceptance that writing happens in various contexts and awareness that when students enter writing classrooms, they have their own individual criteria of writing. Their idea of what constitutes good writing reflects the influence of previous sociocultural and disciplinary experiences (McKinley 2006; Lvovich 2003; Hyland 2002).

This reflects to an extent a holistic view of learning. Jarvis (2007) asserts that holistic learning is "the combination of processes whereby the whole person – body (genetic, physical and biological) and mind (knowledge, skills, attitudes, values, emotions, beliefs and senses) – is in a social situation and constructs an experience which is then transformed cognitively, emotively or practically (or through any combination) and integrated into the individual's own biography" (p. 7). He believes that people learn "in and through experience" which happens when the "inner person" interacts with the "outer world", and this experience covers both longitudinal and episodic ones (Jarvis 2007, p. 1). Thus, there is also a need to look into students' longitudinal writing experience to help them to succeed in writing. This entails examining students' writing in their transition from secondary school to postsecondary education to understand their postsecondary writing. Moreover, focusing on writing transition also addresses the gap in the field (Lee 2012, 2013; Lee et al. 2009; Baker 2011; Kramer-Dahl 2004; Harklau 2001).

1.1 L2 Writers in Transition from School to Postsecondary Education

When students move from school to postsecondary education, they encounter numerous types of texts and data which result in drafting, revising and editing recursively. Discourse in academic texts, cohesive devices and development of ideas (Lee 2013; Ting and Tee 2008; Oda and Yamamoto 2007; Zuraidah and Melor 2004) and academic writing skills (analysis, paraphrasing, synthesising, quoting and making citations, and using knowledge to write essays) (Lee 2013; Lee et al. 2009; Grayson and Stowe 2005; Chen 2002) are challenges ESL student encounters in writing. They also face difficulties in writing different text types, for example, argument, explanation, discussion and instruction, and in writing genres such as reports, research paper and summaries for different disciplines (Lee 2013; Ting and Tee 2008; Bacha 2002). Lea and Street (2000) state that students have to adjust to "new ways of knowing: new ways of understanding, interpreting and organising knowledge" (p. 32). This contrasts with writing in secondary school which is dominated

by examination (Lee et al. 2009; Lee 2013; Tan and Miller 2007; Joseph 2005). Teachers still look at grammar, punctuation and mechanics (Gonzales-Villegas 2007) and sentence patterns (Kaur 2007) in students' writing. They also provide various genres of model essays as templates (Kaur 2007; Kramer-Dahl 2007). In short, writing in university involves reflection and critical thinking in contrast to writing in school which involves reproducing facts, rearranging facts and forming ideas that are new.

Research in the education field tends to view transition as unilinear and collective across individuals (Field 2010; Harklau 2001). Even though writing transition in education can be argued as a collective experience, shared by the same age group in similar sequence, there are differences that exist. Next, the perception of writing becoming more difficult as students progress from secondary school to higher education needs rethinking as research indicates how difficult it is viewed is situated in a student's writing experience. It is not a progression of hierarchical stages of cognitive development (Harklau 2001). It also implies that students do not necessarily experience "collegiate literacy practices as distinctly or uniformly more complex and sophisticated as anticipated in a developmental view" (Harklau 2001, p. 51). Spack (2004) also argues against fitting ESL students and their writing in a developmental model due to their varied background. ESL writers and their individual varied experiences, purposes and needs in writing and the wider contexts and influences in which writing occurs should be accounted for in preparing a writing course for them (Chan and Ain 2004).

2 Theoretical Frame: Sociocultural Theory

Sociocultural theory, originating from Vygotsky (Lantolf and Thorne 2006), contributes to research on individuals and their L2 learning by viewing them more holistically. Traditionally, in research, questions asked of individuals cover who and what. Sociocultural theory adds on the dimensions of how, where and when (Lantolf 2001). It provides a framework of how learners become members who achieve competency in a language learning community. It takes into account that cognition occurs in a social context, i.e. social relationship and culturally constructed artefacts where learning takes place are crucial to learning (Lantolf and Thorne 2006; Lattuca 2002). Basically, sociocultural theory views learning as related to historical, cultural and institutional concepts. Learners bring to learning their own personal histories that is linked to their "values, assumptions, beliefs, rights, duties and obligations" (Donato 2000, p. 46). Thus, to understand how and what an individual learns, the individual himself/herself and his/her social and cultural or historical aspects have to be considered (Lantolf and Thorne 2006; Lantolf 2006; Na'ilah and Hand 2006; Lattuca 2002; Lantolf 2001).

Furthermore, sociocultural theory promotes the concept of mediation to help people participate in an activity which fits in with the view of learning as a socially mediated process (Mitchell and Myles 2004; Johnson 2006). Lattuca defines media-

tion as a "process involving potential of cultural tools to shape action and the unique use of tools" (2002, p. 715). In short, mediation occurs through tools used by individuals to achieve their goal, and at the same time, the tools also act as mediation. These tools are linked to the individual's culture and history (Lantolf and Appel 1994; Thorne 2004). The tools or mediational means determine how an individual interacts with the world, and these tools are formed and utilised for different reasons by different individuals (Lattuca 2002).

Sociocultural theory also views learning as situated. Situatedness refers to different methods of learning in different conditions for learners as they have different histories, signs, etc. (Donato 2000). Situatedness also means that in the existing community of practice, learning is an integral part of participation in that community. Participation in a community reflects that interpersonal relationship is crucial in learning. Contexts and individuals are of equal importance in learning as it is not possible to separate agents (people) and mediational means (contexts, cultural tools) in the learning process (Na'ilah and Hand 2006; Lattuca 2002).

Taking into account the complex interplay of various factors on L2 writing, the sociocultural theory is used in this study to look into students' beliefs about writing, expectations of writing and desire for self-expression in writing to examine factors that influence their academic writing in postsecondary education. To encompass a longitudinal holistic view, this study incorporates the writing transition of the students from secondary school to two semesters of preuniversity and their first year of higher education from a sociocultural perspective.

3 Methodology

The participants in this study were six students between 18 and 19 years old in their first year in a public university in Malaysia. They were given pseudonyms: Ailina, Nadiana, Haziman, Sunitha, Tai Chong and Ju Siang. They had undergone two semesters of pre university education. The first three students did pre-Teaching English as a Second Language Programme (pre-TESL) and the other three were in the American Credit Transfer Programme (ACTP) for preuniversity. They were proficient in English which was their second language. Data in this study was collected through personal interviews, personal narratives and students' writing samples covering secondary school and postsecondary education: two semesters of preuniversity and the first semester of university. Each of the students was interviewed individually four times to elicit data on their writing experience in secondary school, semesters one and two preuniversity and semester one of first year. Three personal narratives (secondary school, preuniversity and higher education) and nine writing samples (three from each level of writing) were collected from each participant. Qualitative method was employed to analyse the data.

4 Findings and Discussion

4.1 Students' Beliefs About Writing

First, the predominant emphasis on writing for marks, grades and exams permeated through the six students' beliefs about writing. It was reflected in the students' views on the importance of writing, their goal in writing and their writing practices. All the six students were in unison that writing was important to achieve their goal of getting good grades in secondary school and to obtain A1 in their Form 5 public examination, Sijil Pelajaran Malaysia (SPM). To illustrate, Tai Chong wrote for "high marks in exams", Nadiana wanted "to get A for SPM" and Sunitha wanted "to get good grades" (Personal interviews 1). Haziman stated that in writing, "every single mark was very important", and Ju Siang wanted to score in writing because his "whole life in secondary school" was "about academic, academic, academic and trying to excel" (Personal interview 1). Ju Siang linked it to the rigid education system which focused on examination. He said, "… me and my teacher, all my friends we think that an essay is just for getting A … As long as you get an A, fine" (Personal interview 1). Moreover, their beliefs also influenced the types of writing they emphasised on to get marks. Their beliefs about writing were also strengthened by their teachers. Ju Siang's English teacher exhorted him to write only factual essays in order to excel during the SPM exam. Ju Siang did so as he did not want to "waste [marks writing a story] because it was SPM" (Personal interview 1). In contrast, the rest of the students concentrated mainly on narrative essays as directed by their teachers. To illustrate, Tai Chong's English teacher encouraged him to use his creativity to write narrative essays to score A for his English paper in SPM. Tai Chong declared, "I wouldn't try to master writing if it wasn't for exam. It's just that in the process of trying to master my writing for exam, I sort of find it quite interesting. Sometimes, I have the urge or passion to write narratives" (Personal interview 1). Some of these students resorted to English tuition classes to achieve excellent results in writing. Nadiana enrolled for tuition classes at an English tuition centre, and Tai Chong was grateful to his tuition teacher who greatly helped him to write well.

When the students entered preuniversity, they had similar beliefs about writing as in secondary school. They followed the expected factual writing and conventions to obtain marks. The students' goals of writing in semester one were mainly to obtain: "A+" (Nadiana), "grades for CGPA" (Sunitha), "A" for writing (Haziman) and "pass with flying colours" and "3.5 for CGPA" (Ailina) (Personal interviews 2, Personal narrative 2). Similar comments were echoed in semester two preuniversity. For example, Sunitha said in preuniversity, "The research paper contributed quite a lot of marks … I had to do it" (Personal interview 3). In addition, there was the practice of "studying" writing to excel in exam among the students which perpetuated from secondary school. To illustrate, in semester two preuniversity, Ailina read up and practised the writing topics her lecturer gave before a writing test. She cited a negative experience whereby she researched on a particular topic which she wrongly expected for a test. She couldn't write well on the different topic which was

given and tried to substitute her lack of ideas with words. She said, "I was in a shock. I was a bit all stressed out, so I thought of good words …" (Personal interview 3). She had to resit the test due to her low marks.

Subsequently, when these students moved on to higher education, they still believed writing as very important for their assignments and grades. They wrote to complete their assignments in order to get high marks, to do well and to pass the exams for their content subjects. Haziman remarked that "… otherwise, he would not be bothered to write" (Personal interview 4). Another example in higher education was Nadiana who emphasised on elaboration of content in her academic writing to achieve high marks.

The findings depicted that writing in secondary school, preuniversity and higher education was predominantly exam oriented. This common occurrence in these three different activity systems of writing was not surprising in view of the highly examination-oriented education system in Malaysia which is actually rooted in a larger societal context. Cheng (1996) asserts that "examination is the soul of the ethos about education in East Asian societies" (in Cheah 1998, p. 192). Cheah (1998) highlights that such an exam-oriented education is part of the sociocultural norms of these societies. Thus, it is not surprising that this exam-oriented writing culture had a strong impact on the six students' beliefs that writing was important in order to pass and to do well in examination. Their goal in writing was to obtain A.

Besides, this examination-driven system dictated literacy (Cheah 1998) and pedagogical practices. There was constant emphasis on schoolwork, homework and tuition in order to pass examination with a string of "As". In Malaysian education, tuition is highly in demand by students and parents who hope that it teaches techniques to perform well in examination (Koo and Soo 2007; Tan and Miller 2007). The results indicated that Nadiana, Tai Chong and Ju Siang took tuition to excel in their writing. The examination-oriented education also places great stress on schools and teachers to produce students who excel in examinations especially public examinations, such as SPM that is taken by the students in Form 5. Lessons are geared to meet examination demands as only the grade, and A at that, matters in writing in secondary school. There is lack of effort to make students think critically about their writing as the main concern is good grades. Next, in pre university, the exam-oriented education also influenced "studying" writing for examinations, for example, memorising model essays or memorising points for content hoping to "strike gold" during examination. However, this could turn out to be disappointing and stressful to students as shown in the example of Ailina in semester two preuniversity who attempted to "spot" the topic for a writing test but was inaccurate and did not do well. This further indicated that even when the students were in preuniversity, their effort and preparation for writing were reflective of their beliefs to do well in examinations. Such beliefs which persisted from secondary school to postsecondary education were due to the historical expectations that writing was important for doing well academically by the students. This historical expectation exists as from a sociocultural perspective, "Learners are historically and sociologically situated active agents …" (Block 2003, p. 109). The above situation depicts that the students had their own histories and their writing was situated in these histories.

In short, in the transition of writing from secondary school to postsecondary education, the students' beliefs about writing were embedded in an exam-oriented education system which in turn was reflective of the sociocultural norm of its society. On a wider scale, from a sociocultural historical context, this exam-oriented education is an artefact developed by human culture, and it affects mediation and the type of thinking which is valued, in this case, the importance of examinations (Lantolf and Thorne 2006; Block 2003).

4.2 Expectations of Writing

The students' expectations of writing in secondary school were related to writing well for exam. Some examples were "good marks in examination" (Nadiana), "to score" (Ju Siang), "master my writing for exam" (Tai Chong) and "to produce essays of high quality" (Haziman) (Personal interviews 1). These expectations were embedded in their beliefs about the importance of writing and their goal of writing.

In postsecondary education, there were mismatches between the students' expectations and writing reality. The students expected writing to be different when they entered semester one pre university. They found that their initial expectations were not fulfilled as they progressed during the semester. Haziman stated, "I thought of complex ideas, you know, things that I've never heard before … it's like we'll be asked to write, for example, the standard of newspapers or journals" (Personal interview 2). Haziman's expectation of this high standard was not met, although his ideas in his writing were more in depth than in secondary school. Ailina's expectations to be able to write "anything" and to do it professionally were also not met (Personal interview 2). Next, Sunitha after her negative secondary school writing experience expected serious subjects only and writing to be "another, boring class", consisting of merely writing essays and passing them up (Personal interview 2). She was surprised that in contrast, she found writing to be enjoyable.

Following this, when the students entered semester two pre university, their expectations of what writing would be like continued to be incongruent with their actual experience. Tai Chong expected a higher standard and more difficult factual writing than semester one. The reality in writing went beyond his expectations. He commented, "Actually, it was more than what I expected. I didn't really expect it to be that technical and that factual, but it turned out, we really learned something about paraphrasing and citing and all that stuff" (Personal interview 3). Sunitha expected writing to be as fun as in semester one but was shocked and unhappy to get more work, film reviews and reading in writing classes.

In first year, inconsistencies still existed between the students' expectations and their experience in writing. Only Haziman and Nadiana expected more hard work with regard to writing and were disappointed when these were not met. Haziman expected "prestigious assignments" (Personal narrative 4) and added, "My perception towards the assignments in the degree program would be piled up and

sort of needing some extra hard work" (Personal narrative 4), but he was disappointed as they were less than what he expected. Nadiana wanted to write "better and better" for "anything", but this expectation was not met (Personal interview 4). She commented, "I don't know what I've learned. Maybe lack of assignments … less than pre-Tesl part 2" (Personal interview 4). In contrast, Sunitha was dismayed to find that "there was a lot of writing to be done in first year" (Personal interview 4) as she expected otherwise.

The students' views of what a good piece of writing should be were also not fully congruent with what they encountered in their writing classes. They were preoccupied with language and vocabulary, although their descriptions covered other writing criteria too.

The students linked good writing mainly to vocabulary, language and then only content in secondary school. Ju Siang, for example, viewed good writing as a piece of writing which he would not stop reading from the start to the end. The writing had "flow", "sentences are beautiful from line to line", "good vocabulary, good grammar and very catchy lines" that "captures [his] attention" (Personal interview 1). Tai Chong believed that a good piece of writing should have "flowery language … that captivate the reader" and "a good flow of essay and storyline" (Personal interview 1). Some examples of such flowery language that he favoured were seen in his narrative essays. They were "Tears will begin to brim in my eyes, which reflect a perfect combination of raw passion and a nauseating sense of poignant" (Form 5 writing sample), and "Even without heavy makeup, the intoxication of her ravishing beauty was so great that even great men would go down pins and needles, faint and helpless with love" (Form 5 writing sample).

When the students were in the first semester of pre university, they still prioritised language and vocabulary which they defined as aspects of good writing. Nadiana equated improvement in writing to the use of very good vocabulary in her writing, "as good as Jane Austen because the vocab that are used in her book are very difficult to understand" (Personal interview 2). Besides, she defined good writing as having good content, clear meaning and main idea in every paragraph. Ailina viewed herself as being "immature in writing" as her "choice of words is still not up to the level" (Personal interview 2). However, there were changes in the students' expectations of good writing as the semester progressed. They emphasised more on content with clear meaning and good organisation: introduction with thesis statement and topic sentences for developmental paragraphs in their definition of good writing.

The students' view of good writing in semester two pre university was still good language, i.e. better sentence structure and less grammatical errors and also the use of flowery words to reflect good writing. In addition, a piece of good writing also had to be well organised and to include mature, original and clear content. To illustrate, Haziman equated good writing as work with mature topics and point of view. Another example was Ju Siang who viewed a good piece of writing as having "the kind of sentence structure [which] is very new and very catchy" and can be remembered and had not been used before, use of "passive voice" and gerunds to give variety to writing (Personal interview 3).

When the students were in their first year, they expected good content in good writing, and this was followed closely by good language and vocabulary. For example, Tai Chong included figurative language as an aspect of good writing, although he realised that he could not use such writing style in first year. He emphasised, "… it would still be writing a good piece of work with … figurative language and something that encourages free flow of ideas, creativity and use of vocabulary. I mean those kind of elements with content, that is what makes a good piece of writing" (Personal interview).

The first part of this discussion looks at the mismatch between students' expectations of writing and writing reality especially in pre university and higher education. The findings showed that in secondary school, the students' expectations of writing were linked to doing well in examinations. In semester one of pre university, the students expected a higher standard in writing which they defined as more "flowery" writing, more specific and mature content, writing like a professional writer, etc. They were disappointed that these were not met except for more in-depth content. There was also the expectation that writing would be boring but it turned out to be otherwise. In semester two pre university, the expectation of a higher standard of writing was also inaccurate as the actual writing was more demanding than expected. Next, in higher education, those who expected hard work involving writing were disappointed as it was the contrary. Meanwhile, those who didn't expect to write found much writing was involved but yet unexpectedly beneficial.

The second part of the discussion here looks at the mismatch between views of good writing and writing reality as displayed by the findings. The students' criteria for good writing in secondary school were good vocabulary and language referring to flowery and bombastic vocabulary followed by content. In the first semester of pre university, good writing was again linked to good language and vocabulary, followed by good content and, later on, good organisation. A similar picture was seen in the second semester of preuniversity. In first year, priority was given to good content but this was still followed closely by good language and vocabulary. The dominant aspect of good writing in these three writing cultures as perceived by the students was flowery vocabulary.

The mismatches in writing in the two areas above indicate that the students were not well prepared for the different levels of writing, i.e. the different activity systems they were supposed to participate in as they made the transition from secondary school to pre university and then to higher education. They did not manage to participate fully in the postsecondary writing communities. This supports the findings from research which have found that students who are progressing from school to higher education do not have good understanding, expectations and approaches to what is needed in university writing and culture (Oda and Yamamoto 2007; Chan and Ain 2004; Preto-Bay 2004; Clerehan and Walker 2003). This is because school writing is less demanding compared to pre university and higher education writing. Besides, the "academic culture" of postsecondary education especially its learning and writing strategies which greatly differ from secondary education also causes students to lack congruence with writing at postsecondary level (Budden et al. 2002). The community of student writers in an activity system, for example, the

culture of writing in secondary school, is unaware of the rules in another new activity system, for example, the culture of writing in semester one pre university.

Moreover, the students were also different in their level of preparation for writing in university (Lillis 2001) as manifested in their varied inadequate writing expectations. This was due to their different prior experiences. For example, Sunitha expected writing in pre university to be boring as her secondary school writing but found otherwise. The mismatch between view of good writing and writing reality whereby importance was given to flowery and bombastic vocabulary can also be linked to the students' prior experiences in writing mostly narratives in secondary school. They used such vocabulary widely in their narratives. Besides, their beliefs that such vocabulary was important in narratives and in good writing had a tenacious hold and coloured their expectations of postsecondary writing even when they had undergone preuniversity writing and higher education writing. This was because their beliefs were perpetuated through their 5 years of writing in secondary school. Studies have indicated that social and cultural contexts can impact a learner's beliefs and, consequently, what he focuses on in language learning (McKinley 2006; Lvovich 2003; Hyland 2002). Students' beliefs about writing have a role in their efficacy too according to McCarthey and Garcia (2005). In the case here, the students' beliefs ensued in an unrealistic and inaccurate focus on vocabulary. In sum, the students' prior experiences and beliefs affected the expectations they had about writing and their participation in writing.

4.3 Desire for Self-Expression in Writing

When the students moved from secondary school to pre university and then to higher education, writing became more formal and then academic. The students grappled with the changes in these types of writing and then gradually acknowledged them. Nevertheless, they still showed a preference for writing that allowed for self-expression and creativity. This desire was largely embedded in their past experiences**.**

The students rated writing as highly important to express their feelings and thoughts in secondary school. Sunitha and Ailina used writing to express and get rid of their feelings when they were upset. Ailina likened writing to a "fairytale land where problems do not occur" (Personal narrative 1). Tai Chong used writing to express his creativity. He said, "Using high-class language, allowing the flow of ideas and tapping into my own creativity while writing the essays really gave me the thrill" (Personal narrative 1). In secondary school, all the students except Ju Siang did mainly narrative writing which they enjoyed. Ju Siang still remembered vividly the single "fun" opportunity he had to write creatively in Form 5 and the details of the narrative essay he wrote about a friend's betrayal.

During pre university, in both semesters one and two, all of the students still valued writing for self-expression. In semester one, the students still had allowance for personal or creative writing through journal writing or narrative writing. Ju

Siang didn't like factual writing in semester one, but writing became interesting, expressive and very fun as there was journal writing which "opened up my door towards expressive writing" (Personal narrative 2). He was free to choose to write on anything and began to express his feelings and thoughts about life and sensitive issues such as race and politics which were not forbidden by his lecturer. He enthused, "The space allocated for our ideas was virtually unlimited and the thought of having someone read what I want them to know was enough to push me further to complete an essay with joy and ease" (Personal narrative 2).

In contrast, Tai Chong felt the same journal writing was insufficient for self-expression for him. He groused, "You can't let your imagination go as wild". "… not much of creativity involved in semester one" (Personal interview 2). He was not happy with preuniversity writing being more of facts and figures. He used his emotions and feelings to write in secondary school but his intellectual capacity to write in preuniversity. Previously, he had the freedom to express himself and to use his creativity to write narrative essays. He continued, "I get a bit frustrated, writing that kind of essays … you get more satisfaction with Form 5 work, rather than semester one. The Form 5 work feels more like my masterpiece" (Personal interview 2). Consequently, he viewed writing as a compulsory subject to cope with the situation.

Following this, in semester two preuniversity, the students still voiced similar sentiments over self-expression in writing. Ju Siang commented, "Any writing other than the research paper in this semester was my opportunity to express [myself]" (Personal narrative 3). He was glad he could write narratives during the semester, and he tried a new style of writing in which he sought to express in an in-depth manner his emotions which were based on his personal experiences. He was on cloud nine when he got A for his writing and stated, "I think that's very enjoyable because you've someone to listen to you, to know your story, to like understand you" (Personal interview 3).

In contrast, Tai Chong chafed that one of the narrative essays he was required to write was based on readings from a provided manual. He had to comply or disagree with several authors' opinions and to assign a theme to the essay. He said, "I find the lack of space and opportunity to express ourselves creatively very disturbing … We were allowed to express our opinions but there were limitations to it and certain restrictions and guidelines to follow. Technically, we did not have much chance to express ourselves" (Personal narrative 3). He contrasted this situation to the opportunity to express his creativity by writing down his thoughts and experiences during journal writing in the first semester. He was free to write whatever he wanted in his journal then. At this point, he perceived journal writing as interesting and fun, but disappointedly, it was not included in semester two.

The desire for self-expression and creativity in writing among all the students persisted in their first year. Ju Siang who considered academic writing as rigid was glad when he had the opportunity to write a narrative essay entitled "Myself" to support his application for an American university. He included dialogues, monologues, fancy words and expression of his feelings in this essay. He happily concluded, "It made the whole essay looked like a story and this was something I could

never do in my academic writing" (Personal narrative 4). As for Tai Chong, he still valued the ability to express himself in writing, to demonstrate his creativity in writing and to use figurative language. He found these lacking in first year and viewed his growth as a writer was limited.

The students depicted that they liked writing which involved self-expression and creativity even though they had to do formal writing in pre university and first year. This desire was seen throughout writing in secondary school to higher education in varying degrees, and it was mainly situated in their beliefs and past experience of writing. Their previous positive experience with narrative writing in secondary school continued to mediate on this preference in writing. Their belief that expressive writing could showcase their creativity and transform knowledge about themselves was embedded in their past experience. Newman and Newman (2005, p. 72) also believe that this "emotional domain is a pervasive filter through which a person organises and interprets experience". The students viewed that writing in secondary school afforded them the most freedom for self-expression and creativity, and this became less as they progressed to pre university and first year. This was because in secondary school, the students did mainly narrative writing, but they had to do more structured formal writing in postsecondary education. They still wrote narratives in preuniversity but not as frequently. Besides, the narrative essays written by the ACTP students in semester two preuniversity were also "formal". They had to relate to themes and include ideas and quotations from their reading. The students felt restricted in their writing and were glad they had writing journals to express their thoughts and views in the first semester of preuniversity writing. Journal writing is viewed as a form of emotional mediation that allows students to be open and share their feelings, thoughts, experiences, conflicts and uncertainties (Rubdy 2004) and even allows for freedom in creativity as students tend to write narrative accounts in their journals (Miller 2004). Even though journal writing was an avenue for self-expression, it was still insufficient for the students who felt they had more freedom in writing in secondary school. The students' desire to write expressively and creatively persists in first year as they dislike the formality of writing in higher education.

The stand that writing is situated in students' past experience reinforces sociocultural theory that students have their histories of writing. To illustrate, the examples of Ju Siang and Tai Chong further attest that the desire for self-expression and creative writing is not isolated but embedded in earlier opportunities for self-expression. Ju Siang who did not have creative writing in secondary school found it fascinating in semesters one and two of pre university. He showed expansion in semester one through his joy in writing and better writing marks in semester two. In contrast, Tai Chong who had a great experience with expressive writing in secondary school found it more favourable than semester one preuniversity journal writing. However, in semester two preuniversity, he found his experience with more personalised writing in the first semester more satisfying than his existing one, when, actually, he had earlier deemed the first semester experience insufficient.

Moreover, the manner of how the students were taught writing has a bearing on this situation. Littlewood (1996, p. 2) asserts that if there is a high emphasis on

"teaching externally-defined conventions" in academic writing, L2 students' "individual expression and creativity" can be suppressed. He further highlights that when L2 students have to conform to the writing patterns they are taught, there is hardly any space for the students' voice in their writing. He suggests that students should be provided with tools to exist successfully in the second-language community.

In view of this, the students' desire for self-expression in writing also calls for a rethinking of the curriculum to give students an avenue to let their voices be heard. Ketter and Hunter (2002) indicate that students' academic writing is more powerful if they are given more agency (voice) in the writing class. The curricula in pre university and higher education are overly formal and restricting to the students because of the demands of writing at these levels, but this does not mean that they are not appropriate as they serve the purpose of formal writing at these levels. A balance between students' needs and institutional requirements can be achieved through the inclusion of a writing course such as creative/personal/expressive writing which gives allowance to students for self-expression. Aside from this, the inclusion of the "personal" in content-based writing in higher education can be implemented through reflective learning journals. Crème (2000) argues for this new form to be included in academic writing as it allows students to bring the personal, i.e., their "intellectual stance" and their "identity in relation with [a] course material" (p. 104). This journal is not totally about "free writing", but it still gives students the power for self-expression as they reflect and write about how their lives (academic and non-academic autobiographies), learning processes and course materials are connected.

5 Conclusion

An obvious aspect which occurs in postsecondary writing is it is steeped in students' beliefs about writing being important to excel in examination. This contradicts the notion of writing at this level evoking critical inquiry and a wider purpose of writing, but this is not surprising due to the learning and writing histories of the students and their sociocultural contexts especially that of their exam-oriented education system. The picture which emerges is writing is highly valued for producing academic results and not well projected for broader use in future learning or work. The students believe that good language and "flowery" vocabulary matter highly in pre university writing and this extends into higher education, although good content is given a little more importance in first year. There is also the belief that writing needs to be of a higher standard in pre university compared to secondary school, and one criterion of this standard is good language and vocabulary. In higher education, ironically, students who expect a great deal of writing find it less than expected and vice versa. Such situations raise questions on how well students are prepared (Oda and Yamamoto 2007; Chan and Ain 2004; Preto-Bay 2004; Clerehan and Walker 2003) and their level of preparation (Lillis 2001) as they participate in writing in pre university and higher education which have their own rules to be part of these communities. An intriguing finding is the contradiction seen among the students about

formal writing. They dislike formal writing even though there is gradual awareness, acceptance and compliance to the formal writing needed in pre university and, especially, in higher education. The compliance which is embedded in examination performance seems to be on a surface level because there is a high regard among the students for less formal and expressive writing which is situated in their desire for self-expression in writing. The students' preoccupation with expressive writing in first year even though they try to address the required formality of writing in first year indicates the deeply embedded stronghold of a student's history. To conclude, the sociocultural framework of this study calls for a re-examination of assumptions about ESL students and their writing. Individual, institutional and societal factors impacting students' writing need to be recognised as laminated with their histories, experiences and participation in writing.

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Emotional Intelligence and Academic Achievement: A Study Among Students of a Private University in Malaysia

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Abstract There are many factors influencing a student's achievement in academic. One of the factors is emotional intelligence (EI). The relationship between EI and academic achievement was investigated in this study. The result showed that one of the EI components (i.e. use of emotion) is positively correlated to EI. The study also revealed that the female respondents scored lower than male respondents in EI mean score. However, the difference in EI between genders is not statistically significant. The difference in EI between years of study was also studied and it was found insignificant statistically. The results revealed an interesting finding that the respondents in this study, regardless of the years of study, self-reported that they are better in appraising their own emotions, but weaker in controlling their emotions.

Keywords Emotional intelligence • Academic achievement

1 Introduction

Good academic performance is undoubtedly a research after the heart of educational psychologists (Maraichelvi and Rajan 2013). Factors influencing a student's ability to succeed in the classroom receive considerable attention from scholars, educators and government (Jaeger and Eagan 2007). In a research conducted by Sternberg (1998, as cited in Jaeger and Eagan 2007), the author found that conventional intelligence tests correlate at a respectable level (about 0.4–0.6) with school grades. However, these tests account for only small percentage (25 %) of the variation in individual performance, leaving the remaining of the variation unexplained (Stenberg 2008, as cited in Jaeger and Eagan 2007). Many researchers have conducted research in exploring the unexplained variance (Jaeger 2003, 2004; Parker et al. 2005; Rozell et al. 2002; Swart 1996 as cited in Jaeger and Eagan 2007). One of the factors found justifiable to explain the variance is emotional intelligence (EI). In a research exploring the impact of EI and general intelligence on individual

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performance conducted by Lam and Kirby (2002), the authors found that overall emotional intelligence, emotional perception and emotional regulation uniquely explained individual cognitive-based performance over and beyond the level attributable to general intelligence. According to Maraichelvi and Rajan (2013), EI is not, in itself, sufficient to create optimal outcomes for youth. However, the way of emotional intelligence being used, both by youth and those who support them, has a powerful effect on their lives.

The present study aims at studying the relationship between emotional intelligence (EI) and academic performance of tertiary students. The following research questions are addressed:

1. Is there any significant correlation between EI and the academic performance of tertiary students?
2. Is there any significant difference in the level of EI between male students and female tertiary students?
3. Is there any significant difference in the level of EI between years of study?

2 Literature Review

Emotional intelligence (EI) has received much attention as being more responsible for success than IQ since 1990s (Goleman 1995). Salovey and Mayer (1990) defined EI as one's ability to monitor feelings and emotion of self and others and use that information to guide one's own thinking and actions. EI is a type of social intelligence that involved the ability to monitor one's own and others' emotions, to discriminate among them and to use the information to guide one's thinking and actions (Salovey and Mayer 1990). The ability to recognise the meanings of emotions and their relationships, and to reason and problem solve on that basis, was the result of EI (Mayer et al. 2000).

The concept of emotional intelligence was defined and explained by different scholars in terms of models constructed from various emotional skills (Maliha and Rehana 2010). Caruso et al. (2002) divided these models into two types: ability models (Mayer and Salovey's model) and mixed models (Goleman's model and Bar-On's model). Mayer and Salovey (1997) proposed a four-branch model of emotional intelligence that includes the abilities to:

(a) Accurately perceive emotions in oneself and in others.
(b) Use emotions to facilitate thinking.
(c) Understand emotions, emotional language and the signals conveyed by emotions.
(d) Manage emotions so as to attain specific goals.

Goleman (2000) identifies four domains of emotional intelligence that comprise 20 competencies. The four major domains are Self-Awareness, Self-Management,

Social Awareness and Relationship Management. Bar-On (2006) developed the Bar-On EQ-i which is an inventory consists of five major components and 15 subscales of these components. The five composite scales include Intrapersonal Component, Interpersonal Component, Stress Management, Adaptability and General Mood.

Wong and Law (2012) developed the Wong and Law Emotional Intelligence Scale (WLEIS). The instrument contains 16 self-report items which were grouped in four subscales based on Mayer and Salovey model of EI (Wong and Law 2012). The four subscales are as follows:

(a) Self-emotion appraisal (SEA): SEA is the person's ability to understand his/her own emotions and expressing these emotions in a natural manner.
(b) Emotional appraisal of others (EAO): EAO is the person's ability to understand and perceive the emotions of others around them.
(c) Use of emotion (UOE): UOE is the person's ability to make use of his/her emotions by guiding them to personal performance and productive activities.
(d) Regulation of emotion (ROE): ROE is the person's ability to control their own emotions.

2.1 EI and Academic Achievement

Academic performance is often referred to as achievement or, alternatively, the level at which a person has learned to perform a particular skill (Mayer and Salovey 1997). There are many factors influencing the academic performance of students in classroom (Jaeger and Eagan 2007). In Ransdell's study (2001), she focused on predicting college success as measured by students' grade point averages (GPAs) and identified two categories of predictors: ability measures (include verbal ability and quantitative ability) and noncognitive variables (include interest in school, willingness to study, persistence, time spent on outside activities and encouragement from parents).

Some researchers (Vela 2003; Abdullah et al. 2004: Parker et al. 2004; Bastian et al. 2005; Marquez et al. 2006; Maliha and Rehana 2010; Ahammed et al. 2011; Walsh-Portillo 2011; Preeti 2013) have explored the possible relationship between EI and academic performance (also referred to as GPA, academic achievement and academic intelligence) (Jaeger and Eagan 2007) and their finding results are varied.

In Vela's study (2003), the author claimed that there was a significant correlation between Emotional Intelligence Quotient (EQ) and academic achievement. Other researchers including Abdullah et al. (2004), Parker et al. (2004), Marquez et al. (2006), Jaeger and Eagan (2007), Maliha and Rehana (2010), Walsh-Portillo (2011), Maraichelvi and Rajan (2013) and Preeti (2013) also claimed that there was a significant relationship between EQ level and students' academic achievement. On the

other hands, Bastian et al. (2005) and Ahammed et al. (2011) found that the correlation between EI and academic performance was not statistically significant.

Different EI instruments were used by the researchers in their studies in exploring the relationship between EI and academic performance. For instance, Vela (2003) used the EI instrument developed by Nelson and Low whereas Parker et al. (2004) and Maliha and Rehana (2010) used Bar-On's Emotional Quotient inventory (EQ-i:YV) in their research. Some other instruments used include Mayer-Salovey-Caruso Emotional Intelligence Test (Marquez et al. 2006), Adolescent Multifactor Emotional Intelligence Scale (Abdullah et al. 2004), Mangal and Mangal's EI Inventory (Maraichelvi and Rajan 2013) and Test of Emotional Intelligence (Preeti 2013).

The academic performance variable used by the authors is also different. Vela (2003), Parker et al. (2004), Jaeger and Eagan (2007), Ahammed et al. (2011) and Walsh-Portillo (2011) used grade point average (GPA) in their study, whereas some researchers used other measurements such as midterm academic results (Abdullah et al. 2004), coursework marks and final examination marks (Chew et al. 2013), tertiary entrance rank (Bastian et al. 2005) and cumulative grade point average (CGPA) (Maliha and Rehana 2010), perceived academic success (Ahammed et al. 2011) and final grades for certain subjects (Marquez et al. 2006; Durgut et al. 2013) and Academic Motivation Inventory (Preeti 2013).

In this study, we hypothesise that:

H1: There is a significant relationship between EI and academic performance in terms of GPA.

2.2 EI and Gender

In terms of gender difference, generally, women tend to be more emotionally expressive than men (Sanchez-Nunez et al. 2008). Harrod and Scheer (2005) found that there was a significant difference in the scores of males and females on emotional intelligence with females reporting higher EI level. Abdullah et al. (2004), Parker et al. (2004), Jaeger and Eagan (2007) and Walsh-Portillo (2011) also found that there was a difference between the EI scores of male and female. However, Katyal and Awasthi (2005) found that though females score higher in EI, difference was not as significant to be conclusive but only suggestive of the trend. Maliha and Rehana (2010) found that there was no difference in the mean EQ scores of male and female students.

In this study, we hypothesise that:

H2: There is a significant difference in the EI between male and female tertiary students.

2.3 EI and Years of Study

The research studies on the relationship between EI and academic achievement were conducted at different levels of study. Some of the researches were conducted at secondary level of study (Abdullah et al. 2004; Parker et al. 2004; Marquez et al. 2006; Preeti 2013) while some others were conducted at tertiary level of study (Vela 2003; Bastian et al. 2005; Jaeger and Eagan 2007; Ahammed et al. 2011, Durgut et al. 2013; Maraichelvi and Rajan 2013; Chew et al. 2013). At tertiary level of study, researches took place at different years of study, such as Jaeger and Eagan (2007) focused on first year tertiary students, Maraichelvi and Rajan (2013) focused on final year tertiary students and Chew et al. (2013) studied the relationship between EI and academic performance in first and final year medical students. Jaeger and Eagan (2007) found that EI is positively correlated to the academic performance of first year students. Maraichelvi and Rajan (2013) also found that EI is positively correlated to the academic performance of final year students. Chew et al. (2013) revealed that the total EI score was correlated to the final year medical students' academic performance but it was not correlated to the performance of first year students.

In this study, we hypothesise that:

H3: There is a significant difference in EI between years of study.

From the literature review, EI can be positively correlated with academic performance according to some researchers. However, there were some researchers who indicate contradictory empirical results that EI is not significantly correlated with EI. These contradictory empirical results do not provide educators or policymakers with a clear direction on how, and when, to consider EI in discussions of student academic performance. Additional research is warranted in examining the relationship between EI and academic performance.

3 Method

The present study follows a descriptive research design. Correlations analysis was used to determine the relationship between the variables. Three types of data were gathered, namely, demographical information, students' EI level and academic achievement in terms of grade point average (GPA) using a survey questionnaire.

Respondents for this study comprised of students at different year of study from a private education institution located in Klang Valley, Malaysia. Three hundred and thirty sets of questionnaire were collected. However, only 282 (or 85.45 %) questionnaires were fully completed and valid for data analysis. Convenience sampling method was used where the survey questionnaires were distributed to the participants who were willing to participate in the study in the campus of the private education institution. The questionnaires were collected after the participants have completed the questionnaires.

The instrument used to measure the EI level is Wong and Law Emotional Intelligence Scale (WLEIS). WLEIS was developed by Wong and Law in 2012. It contains of 16 (sixteen) self-report items which were grouped in four subscales which are self-emotion appraisal (SEA), emotional appraisal of others (EAO), use of emotion (UOE) and regulation of emotion (ROE). Each of these subscales is measured with four items or questions and the answers are categorised with a 7-point Likert scale of 1 being strongly disagree to 7 being strongly agree. Reliability analysis was conducted using SPSS Cronbach's alpha to check the reliability of the instrument. WLEIS was used in the study of Song et al. (2010) and Law et al. (2004) in China and they claimed that this scale is more appropriate for Chinese respondents than Western-developed EI scales.

Academic achievement is measured by using students previous semester grade point average (GPA). The classification was adopted from the university classification as outlined by the award board. The four classification categories are GPA between 3.67 and 4.00 (Excellent), GPA between 3.33 and 3.66 (Very Good), GPA between 2.67 and 3.32 (Good), GPA between 2.00 and 2.66 (Pass) and GPA between 0 and 1.99 (Fail).

Upon completion of the data collection, data analysis is done using SPSS v18. The questionnaires which were incomplete were filtered from the data analysis. Data analysis begins with assessing the overall fitness of data through Principal Component Analysis. It is followed by examining the reliability of each construct by evaluating Cronbach's alpha value. The hypotheses were examined by using Pearson Correlation, *t*-test and ANOVA.

4 Data Analysis

Table 1a indicates the results from Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Barlett's Test of Sphericity. The two tests help to determine the appropriateness of the factor model. A score of 0.898 from KMO indicates great level of fit of the model (Kaiser 1974). In addition, Barlett's Test of Sphericity indicates that the pairwise correlation is significant ($\chi^2 = 2714.351$; df = 120; $p = 0.000$). Based on the two tests, the set of data is adequate for factor analysis. Table 1b examines the construct validity by evaluating the factor loading within the construct. The factor loadings on the construct satisfied the benchmark of 0.5 as proposed by Hair et al. (1998). This indicates satisfactory item convergence on the intended construct. The construct reliability showed in Table 1c indicates that all factors in the measurement model were above 0.8, a good reliability according to Kline (1999).

Based on the sample of 282 respondents, 52.5 % are male and 47.5 % are female. Out of the 282 respondents, 82.6 % are Malaysian and 17.4 % are non-Malaysian. 50 % of the respondents are from business schools and 50 % of them are not from business school. In addition, 29.8 % of respondents are studying in their first year, 27.7 % are in their second year of study and 42.6 % of them are in the final year of study.

Table 2 depicts the mean for each components of EI being segregated by gender, while Table 3 depicts the mean for each components of EI being segregated by year of study. Table 4 shows the findings for hypotheses.

Table 1 Sample fitness, validity test and reliability test

(a) KMO and Barlett's Test						
Kaiser-Meyer-Olkin Measure of Sampling Adequacy						0.898
Barlett's Test of Sphericity	Approx. chi-square					2,714.351
	Df					120
	Sig.					0.000
(b) Factor loadings						(c) Cronbach's Alpha
Constructs	Rotated component matrix (a)					
	Component					
		1	2	3	4	
Emotional intelligence						
Self-emotion appraisal (SEA)	SEA1	0.849				0.833
	SEA2	0.843				
	SEA3	0.837				
	SEA4	0.811				
Emotion appraisal of others (EAO)	EAO1		0.822			0.848
	EAO2		0.820			
	EAO3		0.797			
	EAO4		0.736			
Use of emotion (UOE)	UOE1			0.810		0.882
	UOE2			0.807		
	UOE3			0.777		
	UOE4			0.758		
Regulation of emotion (ROE)	ROE1				0.775	0.906
	ROE2				0.756	
	ROE3				0.751	
	ROE4				0.607	

Table 2 Mean differences between male and female in each components of EI

Components of EI	Gender	*N*	Mean	Sd
EI as a whole	Male	148	**5.1495**	0.89923
	Female	134	**4.9795**	0.83101
Self-emotion appraisal (SEA)	Male	148	5.3159	0.96069
	Female	134	5.0634	1.05564
Emotion appraisal of others (EAO)	Male	148	5.0000	1.07499
	Female	134	5.1511	0.99577
Use of emotion (UOE)	Male	148	5.2128	1.17563
	Female	134	5.0224	1.17078
Regulation of emotion (ROE)	Male	148	5.0642	1.28609
	Female	134	4.6754	1.16578

Table 3 Mean differences between years of study in each components of EI

Components of EI	Gender	*N*	Mean	Sd
EI as a whole	First year of study	84	**5.1839**	0.92016
	Second year of study	78	**4.9086**	0.80988
	Third year of study	120	**5.0922**	0.86377
Self-emotion appraisal (SEA)	First year of study	84	5.2946	1.10527
	Second year of study	78	5.0705	0.98355
	Third year of study	120	5.2083	0.96326
Emotion appraisal of others (EAO)	First year of study	84	5.1339	1.12906
	Second year of study	78	4.9391	0.94679
	Third year of study	120	5.1146	1.03149
Use of emotion (UOE)	First year of study	84	5.2649	1.18178
	Second year of study	78	5.0032	1.25647
	Third year of study	120	5.1000	1.11399
Regulation of emotion (ROE)	First year of study	84	5.0357	1.20937
	Second year of study	78	4.6154	1.20314
	Third year of study	120	4.9417	1.27588

Table 4 Findings for hypotheses

Hypotheses		Results
H1	H1: There is a significant relationship between EI and academic performance in terms of GPA	**Partially supported**, where
		EI as a whole – not supported ($p>0.01$)
		SEA – not supported ($p>0.01$)
		EAO – not supported ($p>0.01$)
		UOE – supported ($r=0.186$, $p<0.001$)
		ROE – not supported ($p>0.01$)
H2	H2: There is a significant difference in the EI level between male and female tertiary students	Not supported ($p>0.01$)
H3	H3: There is a significant difference in the level of EI between years of study	Not supported ($p>0.01$)

5 Findings and Discussion

Based on Table 2, female students' EI mean score as a whole (mean = 4.9795) is lower than EI mean score for male students (mean = 5.1495). In terms of EI components, male students scored highest mean score on self-emotion appraisal (SEA) (mean = 5.3159) and lowest mean score on emotion appraisal of others (EAO) (mean = 5.000). However, female students scored highest mean score on emotion appraisal of others (EAO) (mean = 5.1511). The lowest mean score that female students obtained is 4.6754 for regulation of emotion (ROE). Table 4 indicates that there was no significant difference between the EI of male and female students to that of academic achievement ($p<0.0001$). The results were contradictory to the

literatures of Abdullah et al. (2004), Parker et al. (2004), Jaeger and Eagan (2007) and Walsh-Portillo (2011). However, this result is consistent with the study of Maliha and Rehana (2010), Abdullah (2006) and Petrides and Furnham (2000) which found that there was no difference in the mean EQ scores of male and female students. After analysing the research studies on gender differences in emotional intelligence, Sanchez-Nunez et al. (2008) concluded that the self-report- and performance-based measures of emotional intelligence provide different information. Women tend to self-report lower than they show to have in performance tests. Sanchez-Nunez et al. (2008) explained that women tend to underestimate themselves and men tend to overestimate themselves as regards their emotional skills. Perhaps this can explain why female students' EI mean score as a whole (mean = 4.9795) is lower than EI mean score for male students (mean = 5.1495) in this study.

Based on Table 3, the mean scores on EI as a whole obtained by first year, second year and third year students are 5.1839, 4.9086 and 5.0922, respectively. In terms of EI components, first year students obtained higher mean score on self-emotion appraisal (SEA) (mean = 5.2946) and the lowest mean score on regulation of emotion (ROE) (mean = 5.0357). Second year students also obtained the highest mean score on self-emotion appraisal (SEA) (5.0705) and the lowest mean score on regulation of emotion (ROE) (mean = 4.6154). The same trend applied on third year students where the mean score obtained by third year students is on self-emotion appraisal (SEA) (mean = 5.2083) and on regulation of emotion (ROE) (mean = 4.9417). Based on the result, it was found that the students in this private university, regardless of the years of study, self-reported that they are better in understanding their own emotion and expressing these emotions in a natural manner, but weaker in controlling their own emotions.

This study also found that there was no significant difference between the EI to that of years of study (Table 4). This finding is different from the study of Chew et al. (2013) who found that the total EI score was related to the final year students' academic performance but not to the performance of first year students. According to Harrod and Scheer (2005), other demographic characteristics such as sex, mother's education, father's education and household income attribute to EI differences. In other words, the year of study might not be the sole demographic characteristic in explaining the EI differences.

As shown in Table 4, there is no significant relationship between EI as a whole and academic achievement. This is consistent with Bastian et al. (2005) and Ahammed et al. (2011) who found that the correlation between EI and academic performance was not statistically significant. In terms of EI components, however, it can be seen that use of emotion (UOE) has a significant relationship between academic achievements. According to the results, academic achievement is positively related to UOE ($r = 0.186$, $p < 0.001$). This relationship, however, was relatively weak. UOE is the person's ability to make use of his/her emotions by guiding them to personal performance and productive activities. According to Salovey and Mayer (1990), individuals differ in their ability to harness their own emotions in order to solve problems. Mood and emotions subtly but systematically influence

some of the components and strategies involved in problem-solving. Salovey and Mayer (1990) proposed that individuals who are able to use emotion tend to be more creative and flexible in arriving at possible alternatives to problems. They are also more apt to integrate emotional considerations when choosing among alternatives.

In the private university where this study was carried out, the module assessment generally comprises of 50 % continuous assessment and 50 % formative assessment. Students, who are good in use of emotion, as explained by Salovey and Mayer (1990), would be more creative and flexible in arriving possible solutions in completing the continuous assessment (for instance, seeing module leaders for guidance, getting advice from seniors, etc.), hence allowing them to perform better academically. Perhaps this could explain why UOE has a significant relationship between academic achievements in this study. However, further research needs to be done to find out more.

6 Conclusion, Limitations and Future Research

This study concludes that there is a significant relationship between one EI component (i.e. UOE) and academic achievement, but no significant relationship between overall EQ level and academic achievement in terms of GPA.

The university administrators and educators who would like to see better academic achievement of students are recommended to focus on guiding students on the use of emotions. For instance, students should be guided on how to capitalise on the capacity of emotional processes to refocus attention on the most important stimuli in their learning environment. Perhaps some interventions should be introduced to help students to reprioritise the internal and external demands on their attention and allocate attentional resources accordingly (Salovey and Mayer 1990). Emotions can be also used to channel the anxiety created by evaluative situations (such as tests) to motivate students to prepare more thoroughly and attain more exciting standards (Alpert and Haber 1960, as cited in Salovey and Mayer 1990).

This study also found that there is no difference between genders in EI. As what Sanchez-Nunez et al. (2008) claimed, women tend to underestimate themselves and men tend to overestimate themselves as regards their emotional skills in the self-report-based measures of EI. In this study, the instrument used to measure the EI level is Wong and Law Emotional Intelligence Scale (WLEIS), which is a self-report-based measure of EI. Perhaps this could provide the explanation why female students' EI mean score as a whole (mean = 4.9795) is lower than EI mean score for male students (mean = 5.1495), and therefore, there is no significant difference between genders in EI in this study. In future research, perhaps performance-based measures of EI should be used in measuring the EI level of respondents. In addition, more studies need to be carried out to test whether WLEIS is appropriate in measuring the EI of Malaysian. This is because so far the researchers who claimed that WLEIS was appropriate in measuring EI conducted their research in China.

This study also found that there is no difference between years of study in EI. This research has only considered samples from one private university in Klang Valley. Extension of sampling scope to other universities around the country may yield a more comprehensive reasoning to inconsistencies found in the results above. Additional variables such as maturity level and parental intervention or involvement could also be inserted into the model for further research in search for a better understanding of differences in culture, in particular the Asian culture. A longitudinal study across different universities is suggested in order to better capture the development of students' emotional intelligence. Other demographic characteristics such as parents' education level and household income should be included in future study. In terms of EI component, there is an interesting finding that the students, though study in different years, scored highest mean on self-appraisal of emotion (SEA) and lowest on regulation of emotions (ROE). Further research can be conducted to see whether the same trend applies on Generation Y as a whole.

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Cross-Cultural Challenges and Synergies Working in an International Collaboration Project

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Abstract This paper provides a general overview of an international collaboration project conducted in an international business module at a private Malaysian university. The international collaboration project is designed to provide students with an experience in working on a cross-cultural virtual team. This study employs a case study which consisted of 34 Malaysian students and the main instrument used in this study is the students' reflective reports. Based on the reflective reports, the paper discusses the challenges and the synergistic experiences faced by the students. In general, students find it interesting to work in this project; on the other hand, students also felt that it is difficult to communicate with others as well as getting the project ready on time. The paper also highlights the benefit of working in this project and some recommendations to academics who wish to embark on such activity in class.

Keywords Cross-cultural • International collaboration project • Global virtual team

1 Introduction

Due to globalisation and the growth of Multinational Corporations (MNCs) around the globe, universities are now offering degrees and masters in the field of international business. Many higher education institutes have also captured quite a large group of students as many believe an international business study enables them to learn about operations in MNCs, various cultural aspects in managing a business, a global outlook and also a possible career with an MNC. Such said experiences could not be easily imparted to students if learning is confined within the four walls of a classroom. Academics could use various methods in teaching, such as case studies,

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videos, role play or business articles, but the learning is still very static and there is opportunity to enhance teaching in international business (Jurse and Mulej 2011). A more dynamic exposure would be allowing our students to gain experience working in real global teams and to acquire the ability to communicate effectively across different cultures. Having such opportunity would certainly enrich the learning experience and would enable higher education institutions to develop a pool of cross-culturally proficient talent (Johnson et al. 2006). Doh (2010) has argued that it is important to have cross-cultural element in a business degree, more specifically in an international business degree.

In view of the importance to have cross-cultural element in studies, it is essential for education providers to embed this critical aspect into the curriculum. Many researchers have argued that good managers cannot be trained purely based on classroom setting (Mintzberg and Gosling 2002). These managers need to be given the opportunity or chance to experience the real context. In order to provide such "real" experience for the students, we have adopted the global virtual teams (GVTs) as a form of experiential learning for our undergraduate students who major in international business. The concept of GVTs in education is very similar to the working world where members of MNCs are required to communicate virtually with their counterparts or even complete a project or task through working on a virtual platform (Zakaria and Al Safi 2013).

GVTs are different from traditional teams as GVTs might consist of people from various background, cultural setting, and time zones and rely heavily on information technologies to communicate, and most probably, they do not have any past working experience before the GVTs were formed (Powell et al. 2004; Fuller et al. 2007; Zakaria and Al Safi 2013). Working in a GVT could be quite challenging as members do not get the opportunity to meet physically to gain trust or to know each other. In fact, members need to rely purely on technology to communicate, and to make it more challenging, members of a GVT come from various countries with different cultural background. In order to execute the project well, GVTs often face tremendous challenges in working together.

The purpose of this study is to explore the challenges faced by undergraduate students while completing their coursework through GVTs from the perspective of a developing country. Furthermore, the study also investigated the students' cross-cultural experience working in their respective GVTs. The questions that guided this study were as follows:

1. What type of challenges did the students face in their respective GVTs?
2. What cross-cultural experience did the students encounter while working in their respective GVTs?

2 Literature Review

In order to remain competitive in the global market, many educational institutions and organisations are jumping on the bandwagon to set up global virtual teams (GVTs). According to Zakaria and Al Safi (2013), GVTs are becoming "the most widespread and innovative working structure in Multinational Corporations".

GVTs consist of team members from various cultural backgrounds and locations, with often no prior relationship, who collaborate towards achieving a common goal (Mohd Yusof and Zakaria 2012 as cited by Zakaria and Al Safi 2013). The GVT structure, which utilises computer-mediated communication (CMC) tools, allows diverse team members to operate in distant locations, thus bridging members from various geographical locations and time zones (Egea and Gregor 2002).

The diversity of group members, which is a key feature of globally distributed teams, has brought about many synergistic benefits. One such synergy is the increased collaborative teamwork and communication skills. Team members report bilateral experiences and the formation of strong relationships and continued friendships when working in GVTs (Zakaria and Al Safi 2013). They also feel that their opinions were valued in such teams (Goold et al. 2008) as they actively participated and contributed to the team (Alon 2003). Alon further elaborates that GVT members obtained a "real-world" collaborative experience that provided them with "real-world" skills and abilities that can be reproduced in future GVT tasks. This is made possible as globally distributed teams "gain access to expertise and knowledge that is geographically dispersed" with the potential to leverage knowledge strategically (Garrison et al. 2010). Research also suggests that demographically diverse teams bring about an increase in creativity, decision quality and innovation (Jehn et al. 1999).

The use of technology also enhances GVTs as geographical distance and time zone differences are mitigated. Both asynchronous and synchronous communication which are inexpensive and offer free real-time interaction can be utilised by virtual teams (Pottert et al. 2000; Goold et al. 2008).

Other benefits include formation of emergent leadership, learned diverse managerial styles and competencies skills and international exposure to diverse cultures without the need to travel abroad (Zakaria and Al Safi 2013).

However, various challenges have also become evident among GVT members. Garrison et al. (2010) have raised concerns that the extent of diversity within a team would impede team cohesion and individual performance, thus negatively influencing individual productivity. They have attributed the cause for the decline in productivity among diverse groups to the issues of trust and cohesion, which are found to be lacking. They assert that efforts to enhance the use of distributed teams in a global strategy may, in actual fact, cause a reduction in knowledge sharing, individual productivity and team performance, due to the lack of trust in diverse team members (Nemeeth 1986 as cited by Garrison et al. 2010). In addition, differences in demographic attributes result in less cohesion and social integration and lead to the formation of stereotypes (Horwitz and Horwitz 2007).

Similarly, Goold et al. (2008) consider trust as an essential factor in teamwork. Unlike face-to-face teams, virtual teams may not have sufficient time to build trust among team members due to the slow development of relational bonds among members (Garrison et al. 2010). As a result, the essential stages of group development, i.e. forming, storming, norming and performing (Tuckman 1965), may not have been achieved (Goold et al. 2008).

GVTs also experience many challenges in using computer-mediated technologies. Students involved in GVTs may be resistant to change as it requires much coordination among team members, apart from the necessity to conduct many hours of "searching and researching questions and issues never explored before" (Alon 2003).

In addition, students are challenged by the use of timely email, whereby their preference for a satisfying, productive near-synchronous communication with other team members (Egea and Gregor 2002) is not always achieved. This is due to delayed interactions that hinder and complicate the exchange of ideas among team members resulting in a decline in both individual and group productivity (Garrison et al. 2010) probably due to differing time zones or a GVT member's attitude towards work.

GVTs also encountered difficulties with differing attitudes of members. The negative attitude of some members was evident in their lack of concern about deadlines and the time taken to respond to the team (Goold et al. 2008). Heavy reliance on electronic communication makes communication difficult when unwilling team members place little importance on responding to communication received (Egea and Gregor 2002).

The difficulty in managing such team members is evident in a number of studies, and Goold et al. (2008) have identified two such groups, i.e. "*lurkers* (individuals who do not actively participate in the online environment) and *shirkers* (those who do not arrive in the online environment)" (p. 349). Thus, challenges arise when GVT members encounter difficulties in reaching out to the unwilling members because of the lack of personal contact which is exacerbated by psychological distance (Zakaria and Al Safi 2013) and geographical distance (Egea and Gregor 2002; Garrison et al. 2010).

Language behaviour presents another challenge in GVTs. Overall understanding may be hindered when there is the absence of a shared language among all members (Garrison et al. 2010). As members have different levels of proficiency in the shared language, a member who is less proficient in the shared language may be perceived as being less competent and less able to contribute to the task (Pottert et al. 2000).

3 Methodology

3.1 Context

The present study was conducted in an international business module at a private university in Selangor, Malaysia. The course was a compulsory subject offered to international business major undergraduate students. The main objective of this assessment was to provide students the understanding of working in a GVT as well as to assess the challenges faced by them. Each student was allocated a GVT and every team had to work on developing an international business plan for an imaginary MNC. These GVTs served as consultants for these MNCs and had to provide a comprehensive expansion plan for the senior executives of these MNCs. The sample MNCs used in the assessment are (but not limited to) Walt Disney, Google Inc, ALDI Einkauf, McDonald's, Toyota and HSBC Holdings.

The project was monitored and administered by the faculty member who is teaching the module. The participation into this project was entirely voluntary. Students from 37 countries and about 81 universities participated in the GVT assignment. Working with students around the globe gave an opportunity for our students to experience a true GVT context. Upon completion of the task, each student was awarded a certificate of participation.

3.2 Participants

The participants of this study were a mix of 32 local and international students. The students were a mixed gender between the ages of 20 and 21 years old. In terms of language, for some of the students, English is their first language, while for the others English is their second or third language. The students were in second year of their studies majoring in international business degrees.

3.3 Case Study Approach

This study employs a case study design because a case study is one type of qualitative research that investigates a phenomenon in a natural setting within a bounded system (Merriam 1998; Stake 1995; Yin 2003). Merriam (1998) states that the case can be a person, particular situation, programme, group or phenomena and it helps to gain an in-depth understanding of the situation and the meaning it provides. In this study, the researchers wanted to gain insights on GVTs as a novel platform and the structure of cross-cultural virtual teams using a variety of computer-mediated communication tools. The case study approach also enabled the researchers to

understand the types of challenges faced by the students and the cross-cultural experience which are beneficial to the students in the GVTs.

3.4 Data Collection

The main data source for this study was obtained from the students' reflective report. The reflective reports are important in this study as it provided detailed information on the challenges and cross-cultural experience of the students.

The reflective reports were collected at the end of the semester, in week 12 after they had completed the project with their respective GVTs. Students were informed that the reflective report is part of a research project and their participation consent has been obtained. Several questions were provided to the students in order to gain insight on their experience working in a GVT, such as:

1. What have you learned?
2. What worked well?
3. What are challenges and why?
4. What would you do differently?

3.5 Data Analysis

This research was guided by the constant comparative method set out by Glaser and Strauss (1967) and open, axial, and selective coding strategies (Strauss and Corbin 1998). Analysis occurred at the same time as data collection. The data from the reflective report was arranged and coded into categories. The coding categories were developed through the reading of the reflective journals as relevant phrases and sentences were identified by either underlining or bracketing them and then the meaning of each significant sentence or paragraph was coded in the margin. Once the marginal remarks were coded and written on the reflective journals, a list consisting of all the codes and the page numbers of the reflective journals on which the codes appeared were made.

First, the coding categories for occurring themes were identified through the reading of the reflective journals. The reflective journals were read through individually to develop a system of categorisation. In order to develop an appropriate categorisation, it took several rounds of individual categorisation followed by intensive discussions with two other lecturers until a consensus on an appropriate categorisation model was reached. The data was analysed based on what was the students' challenges and their experience in the GVTs. After analysing the contents of the journals, there were several recurring themes that emerged which were language barrier, time zone differences, different working style, noncommitted and passive group member(s) and email miscommunication, and the students used a

variety of computer-mediated communication (CMC) tools such as Facebook, Google Docs, Dropbox and email; exposed to different and new cultures; learned new and different management skills; and experienced working in a GVT structure. Then, it was grouped into two main themes: group challenges and cross-cultural synergies. These themes will be discussed further in the findings and discussion section below.

4 Findings and Discussions

The findings from the students' reflections indicated that the students had both positive and negative experiences working in GVTs. The experience can be grouped into two main categories which are group challenges and cross-cultural synergies. The group challenges that the students faced were language barrier, time zone differences, different working style, noncommitted and passive group member(s) and email miscommunication. On a positive note, the students mentioned that they have gained positive cross-cultural experience through GVTs such as they used a variety of computer-mediated communication (CMC) tools such as Facebook, Google Docs, Dropbox and email, been exposed to different and new cultures, learned new and different management skills and group cohesiveness and experienced working in a GVT structure.

4.1 Group Challenges

Working in a cross-cultural team will have its pros and cons. This was especially true in the case for our students as they were required to work with team members of different backgrounds and have no face-to-face contact or historical background of working together. Therefore, this study had identified several cross-cultural group challenges working in GVTs faced by our students.

The students highlighted that the first challenge they faced was language barrier. The common language used in their discussion was English as it is the lingua franca of the world. But this became a barrier for some of the team members due to their different levels of English language proficiency. One of the students mentioned that "*some of our members are not fluent in English and it made us hard to interact and exchange opinion*". This made it difficult for the team members to understand what was being conveyed, and as a result, it delayed the group discussion. The students also highlighted that it delayed their work progress as they needed to edit their team members' language in terms of grammar, sentence construction and word usage. This was mentioned by one of the students, "*Language proficiency was a major problem in my team as two of my team members had poor command of English and the rest of us have to be patient with them to understand what was being mentioned in order to get the project going. We also had to edit their work to ensure that it is*

up to standard". Although language was a problem, the students were able to work together on their project due to patience and tolerance among group members and they managed to complete the given task and submit it on time. This substantiated Zakaria and Al Safi's (2013) view that having different command of English language made it challenging to ensure that everyone was on the same page. It further supports Garrison et al.'s (2010) view that overall understanding may be hindered when there is the absence of a shared language among all members.

The second challenge the students commonly cited was time zone differences. The students found it difficult to find a common time as they were all from different parts of the world. As mentioned by a student, "*We had to agree on a time for discussion as we are from different parts of the world and it is difficult to get everyone in the group chat at the same time. We had to wait for our teammates to respond once we had posted our ideas in the group chat, and if we had encountered any problems during the process, we could not immediately obtain their solutions*". The students also mentioned that they usually need to wait half-a-day or a day to get a response from their team members due to different time zones as mentioned by a student that "*our messages were often corresponded at different timing and we corresponded sparingly due to work commitments and exams*". These findings concurred with Zakaria and Al Safi's (2013) study that their students also had difficulties dealing with team members from seven different countries and they had to wait for their members to respond to messages at their own convenience.

A third challenge that the students found was their team members had different working styles. The students found that working in a cross-cultural team has it challenges as different people have different working styles. It was mentioned by a student that "*their working styles were totally different from my working style as they were more relaxed and took things easy compared to me who was anxious about everything. Hence, because of differences in background, perceptions and preferences, it's a challenge for us to reach an agreement on some issues*". Consequently, some of the students were forced to take up the leadership role due to the different working style as mentioned by one of the students, "*my group members were relaxed about the proposal and the deadline is approaching fast, so, I decided to become the leader in the group and divided the work among ourselves*". In order for a cross-cultural team to be successful, the students need to understand each other's working style and compromise in order to succeed in a cross-cultural team and achieve their goal which is to complete the business proposal.

The students also stated that the fourth challenge they faced was noncommitted and passive group member(s). These noncommitted and passive group member(s) gave the students much headache as they were missing from the group's discussion and the other team members needed to cover the parts that were assigned to them. This was mentioned by one of the students that "*there were two group members who were missing in action in this assignment. It was impossible to contact them or find them since each individual was in different countries. My group leader tried to email them continuously but failed to receive any reply. This did not only cause delay in doing up the assignment but our group leader had to reorganise and redelegate the tasks among ourselves*". It was also highlighted that these irresponsible

and noncommitted members stressed them out as cited by a student that "*Moreover, some of them did not fulfil their responsibilities to get their job done and they only submitted their assigned task to me on the very last minute as I was in charge of editing and I struggled to complete my task on time*". This supports Goold et al.'s (2008) claim that the main difficulty of online teams is the management of "*lurkers* (individuals who do not actively participate in the online environment) and *shirkers* (those who do not arrive in the online environment" (p. 349). But all this experience did not demotivate the students to continue working with other members who were committed in their team as a student claimed that "*we had two group members who did not respond to the multiple emails sent to them but they did not hold us back from achieving our target as the others were working hard*".

The final challenge faced by the students was email miscommunication. It was found that misunderstanding did occur through the use of email as one student quoted that "*it was quite difficult to use email to discuss our assignment because it caused the group members to have some arguments although it was not done on purpose. The leader asked one member to relook at her points presented and this team member misunderstood it as asking her to change her whole write-up*". Miscommunication was also caused by the tone and words used in the email as another student stated that "*the tone and words used in the email were harsh and some of the group members were upset about it. But luckily, we managed to work things out as our leader explained to us what he meant and wanted from us. I guess it's a culture difference thing*". This concurs with Egea and Gregor's (2002) study that poor communication skills through the use of email can cause frustration to group members and delay in completing the task at hand.

4.2 Cross-Cultural Synergies

In general, the students mentioned that participating in GVTs provided them with a rewarding experience despite the challenges mentioned above. They were grateful to have been given the opportunity to be exposed to such cross-cultural project without the need of travelling abroad. It also exposed them to new learning experience and knowledge which was not possible to gain through a normal classroom setting. The project had provided students with working in new cultures and helped broadened the students' mind on different lifestyles and work processes.

The first rewarding experience working in GVTs was being exposed to a variety of computer-mediated communication (CMC) tools such as Facebook, Google Docs, Dropbox, Skype and email. A majority of the students mentioned that they were being introduced to the use of different CMC tools for the first time as mentioned by a student that "*I have no idea what or how Dropbox and Google Docs function but thanks to this project, I have now acquired the knowledge of using Dropbox and Google Docs. These tools are helpful and how it could ease in doing a group project which I may be able to adopt in my future group assignments*". The use of CMCs in the GVTs project also helped the students to improve their CMC

skills as one of them claimed that "*…it has improved my skill of using online collaboration tools such as Google Docs and Skype which I seldom use. The online collaboration tools are very important for us to share our information and researches that we had done. This is an important skill as it is a useful skill in the corporate world*". This proves that being able to use a variety of CMC is beneficial to the students as it is an important skill needed for their future working life. This finding concurs with Zakaria and Al Safi's (2013) study that their students acquired a number of technical competencies through GVT.

The second rewarding experience the students gained was being exposed to different and new cultures. The students had the opportunity of being exposed internationally without having to travel across the globe. A student mentioned that "*I've gained some knowledge about different countries and people whom I've never met before. It was such a thrill to work with people from different countries as I've always worked with people from my own country*". Another student claimed that "*This is by far one of my best experiences so far as working in a team of six who are from Spain, Brazil, UAE, USA and Indonesia to come up with a business plan. I got to know about their culture and a bit more about their country without the need of going to their country and all this was achieved through the use of online communication*". This supports Zakaria and Al Safi's (2013) study that the students' mindset was broadened as they found out about their foreign team-mates' lifestyles and work processes and it also helped them learn about cultures and habits which were new and foreign to them.

Another rewarding segment of the project which was commonly cited by the students was that they learned new and different management skills. Students gained many new skills: having good time management, gaining interpersonal skills, delegating tasks according to their group members' strengths and weaknesses, being proactive, and being open-minded were the commonly acquired skills being highlighted by the students. These are all important skills needed for a successful GVT. One of the students claimed that "*… it has actually improved my interpersonal skills … as I have learnt how to communicate with people from different cultural background. Being tolerant and a listener are keys on how to interact with people although we have disagreement on some issues and this is an important skill working in an international group setting*". Another student also cited that "*throughout this project, I learnt that having good time management is important to reach our goal of the project as I always procrastinate my work till the very last minute. But, this experience taught me the importance of doing things on time and also I did not want to fail my group members*". This substantiated Zakaria and Al Safi's (2013) study that "students gained good practice in handling a wide range of people which will prove useful in their future professional lives" (p. 171).

The final rewarding experience that the students had was that they acquired the competence of working in a GVT structure. The GVT experience had exposed students to the skills required to form a successful GVT such as being tolerant and patient, leveraging on team member's strengths, having good teamwork and possessing good leadership skills. One of the students mentioned that he learnt "*the importance of teamwork to produce results as everyone was willing to work together*

without any complaints and we completed what was needed within the few hours". Another student mentioned that "*there is a team member who took the role of a leader and she had guided us well and managed to resolve our group conflicts. She has been a great supporter, showed us much consideration, assisted us all the time and cared for us and the project throughout the project. She was also in charge of assigning tasks to the group and she did it very fairly. This taught me that good leadership is needed in order for the project to be successful*". Thus, it is necessary to have the competence of working in a GVT structure to form a successful GVT which necessitates careful planning and management of resources (Zakaria and Al Safi 2013).

5 Implications

The outcome of this research suggests that experiential cross-cultural-based project is beneficial to the students. Academics should incorporate such cross-cultural project into the curricular. Our findings show that adopting GVT-oriented projects is an effective and practical teaching tool for international business-related studies. Based on the reflective report, students find that GVT provides them with good exposure to various cultural elements and they feel that GVT is an interesting learning platform which they have never experienced before. Besides, through GVT, students are more IT savvy and they are able to use or try various applications that have not been utilised before. This truly reflects that students have benefited from collaborating in this GVT.

Other than the positive findings of adopting GVT as a teaching tool, the findings above have also revealed some light on the challenges faced by students while working in a GVT. Such findings are crucial for academicians to better coordinate and design their assessments. Based on the findings stated above, there is a need to have a cultural briefing or training prior to the start of the project. Such briefings or trainings will help to reduce the level of uncertainty of these students working in a GVT for the very first time. In addition, it will also provide some understanding as to what challenges are faced so that students are better able to manage their time and improve communication.

Next, in terms of assessing the project, academics should take note that working in a GVT requires more effort in coordinating and producing the final output. More often than not, some students feel that they are being penalised for the overall team output. As highlighted in the findings above, some students might have weak English or did not participate much in the project. Therefore, assessment of the project should take into consideration these factors. Academics could consider assessing some components based on individual effort and some as a team. Having a clear marking rubric on how individual contribution is evaluated and how team contribution is evaluated (Goold et al. 2008) is crucial for a fair assessment of each GVT member's performance.

6 Conclusions

The findings from this study clearly indicate that GVT has provided students with valuable cross-cultural experience without travelling across borders, and furthermore, it has provided the students a real-world experience of working in a cross-cultural virtual team. The case study shows how the GVT worked and the skills acquired by the students through GVT. Future research could expand the sample to students from different countries (Gonzalez-Perez et al. 2014). It would be extremely useful if results could be obtained within the same group in order to evaluate the group behaviour over CMC. In addition, future research could also cover the effectiveness of GVT towards one's learning in the future. In other words, researchers could investigate whether going through GVT-based project could really help a student in his or her future study of subjects in international business. Researchers might also explore on leadership styles of Malaysian students and how conflicts are managed in GVTs. With the findings and recommendations provided above, we hope other academics would have a better insight on the challenges faced by students and how it could be improved so that students can gain a better learning experience.

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A Study on Factors Affecting User's Interest in Using Social Networking Sites

Jer Lang Hong

Abstract The recent advancement of social networking sites has enabled many people to stay connected anywhere in the world. People are able to make friends, keep themselves updated with the global trends, and communicate with each other using high-speed Internet fiber and wireless devices. The growth of social networking sites continues rapidly; hence, it becomes necessary to introduce new features and concepts to attract more users and stay competitive in the market. One of the marketing approaches is to understand user's emotion and the features that attract them to further use the tools. For example, Facebook introduces relationship status to induce online users to subscribe for their services. In this paper, we study several key aspects which may affect a user's emotion when using social networking sites. A user study is conducted where the users are given exposure to various social networking sites, and an in-depth evaluation is provided to further investigate our hypothesis. We take particular considerations on emoticons, attractive keywords, animated images, attractive deals/offers, colors of text and images, and the user's loyalty as well as the social networking sites' reputation. We conduct the user study on several state-of-the-art social networking sites such as Facebook, Google+, and Twitter. Experimental results show that our analysis on the key features identified has great impact on a user's emotion in using social networking sites. The outcome of our study will be important for future researchers to further research on sentiment analysis.

Keywords Web 2.0 • Social networking sites • Sentiment analysis

1 Introduction

Recent advancement in social networking sites has seen the increase of online Internet users. Users can now easily communicate with each other using high-speed wireless Internet in any location of their choice. People are able to post their

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comments and discuss on certain issues using social networking sites. The comments and posts made by users are invaluable for the commercial companies as well as governmental organizations. This information is very useful for marketing purposes, particularly when a company wishes to know their product strength and weaknesses. User's feedback from social networking sites is not only useful for marketing purposes, they can also be invaluable for predicting an election. For example, the candidacy between Barrack Obama and Hillary Clinton is widely debated during the last US general election. For a candidate to fully understand his strength and weaknesses as well as people opinion regarding certain issues, one may require this information by using a crawler to harvest the vast pool of information from social networking sites. Due to the huge amount of deep web repositories available in the web, it is impractical to manually extract and label them according to the topic of interest as this process can be labor intensive and time consuming.

Posting the user's feedback in social networking sites may require certain skills from the users. Some posts may lead to further discussion, spiraling viral marketing effect. Some posts may be regarded as irrelevant by many users; hence, they are ignored. It is noticeable that certain strategies help to improve on the readability and interest among users. Research has shown that users are not only attracted to the posting made by the users, there are also other external factors that determine the interest of users in reading the post further. One of the key strategies is to implement search engine optimization (SEO) technique, where the content of the post is changed to suit the search engine matching criteria for ranking, hence leading to higher rank in search query results. Another technique involves prominent bloggers where these bloggers (usually the experts in certain field of interest) are invited to write on certain issues pertaining to public interest, on the assumption that the public has more trust on the bloggers' opinion and feedback.

Other factors that may affect the readability of the posts are images, animated icons, highlighted texts, as well as dynamic scripts in webpage. Study has shown that these factors may indirectly attract many users in reading a post further as humans are more attracted to images which may spark their interest. However, few studies have been made to identify the general factors affecting the users' interest in social networking sites posting. In this paper, we aim to identify the factors affecting a user's interest in reading a post. While determining the factors affecting user's interest may be subjective, we aim to identify these factors correctly, by conducting extensive user study to properly verify them. This study will be conducted across all age group and level of education, equally distributed and conducted in separate sessions, in such a way that no bias is found in the results of the survey.

The paper is divided into several sections. The next section describes research related to ours, while the subsequent section explains the methodology in detail. Then, we present our experimental results, and finally we conclude our work.

2 Related Work

In the middle 2000s, wiki has been recognized by the education sector that offers collaboration and constructive learning for the field of education (Klobas 2006). Wiki is also widely used in various disciplines such as teaching and learning, with application across various levels of education stages: (1) primary schools (Dede 2005; Desilets and Paquet 2005; JISC 2009), (2) secondary schools (Lombard 2007; Lund and Smordal 2006; Prensky 2001), and even in (3) higher level education (Augar et al. 2004; Chong et al. 2011; Cubric 2007; Doolan 2007; Fard et al. 2010; Wheeler et al. 2008)

There are various types of learning activities being planned and implemented using Wiki, for example, evaluation and review of journal articles (Cubric 2007; Forte and Bruckman 2006) storytelling (Desilets and Paquet 2005), essay writing (Forte and Bruckman 2006; Wang et al. 2005), and wiki-based glossary of technical terms (Cubric 2007; Glogoff 2006; Samarawickrema et al. 2009). In 2000, five-stage model (Salmon 2000) was originally developed to support the role of e-moderator and scaffold students on a step-by-step basis to learn how to interact with other users online. It focused more on the role of tutors than the role of students.

Garrison et al. developed COI in 2000. The original conception of COI was to improve the practice of users in evaluating computer science conferences and also to help to design, facilitate, and direct higher-order learning. It is an online tool with student participation; however, it does not offer a stage-by-stage guidelines to augment interaction and learning for the users to use Web 2.0 technologies.

Four-stage online presence (4-SOP) model was developed by Goh (2010), and it is derived from theoretical lens of the five-stage model developed by Salmon (Salmon 2000; Zin et al. 2006) and Garrison et al. COI (Garrison et al. 2000; Self and Goh 2009; Zakaria et al. 2010). The themes are based on empirical data obtained from three case studies conducted based on UK context. This model consists of four stages and three online tools with user participation to provide a step-by-step guide in introducing the Web 2.0 technologies to the students. The distinctive feature of this model is to assist lecturers in planning, monitoring, and reviewing the teaching and learning process at appropriate stage. 4-SOP model also focuses on critical thinking skills as the expected learning outcomes.

3 Proposed Methodology

To conduct our user study, a few fundamental steps are required to ensure a smooth and fair study can be carried out. To achieve this, we select a participant pool of 100 web users, particularly those who are well verse with social networking sites. Participants are selected from Taylor's University, and these groups are distributed across different departments. The ages of all the participants range between 21 and

40 years old, under the assumption that these age groups are familiar with social networking sites.

We then prepare a list of questionnaires to evaluate the participants. We identified three state-of-the-art social networking sites (Facebook, Twitter, Google+) and prepared five samples for each of these social networking sites. Each samples contain a diverse content so that a proper identification can be made to distinguish the various factors identified.

We then list out the various factors from our hypothesis and filtered out the factors which are deemed irrelevant. Note that factors which are deemed technically relevant such as search engine optimization and personalization are not taken into consideration in this study. The factors which we have identified are as follows (see Figs. 1 and 2 as examples):

Once these factors are identified, we prepare the samples, identify the factors, and mark the samples containing the factors. Then, we prepare another set of similar samples without the marked factors. We then distributed these samples without the marked factors to the participants for evaluation. Samples are distributed to the participants according to their department randomly. Participants are also grouped into individual classroom so that they do not share the outcome of their survey to other participants.

During the study period, the participants are required to list down the descriptions of the factors influencing the interest of users reading a post in a separate

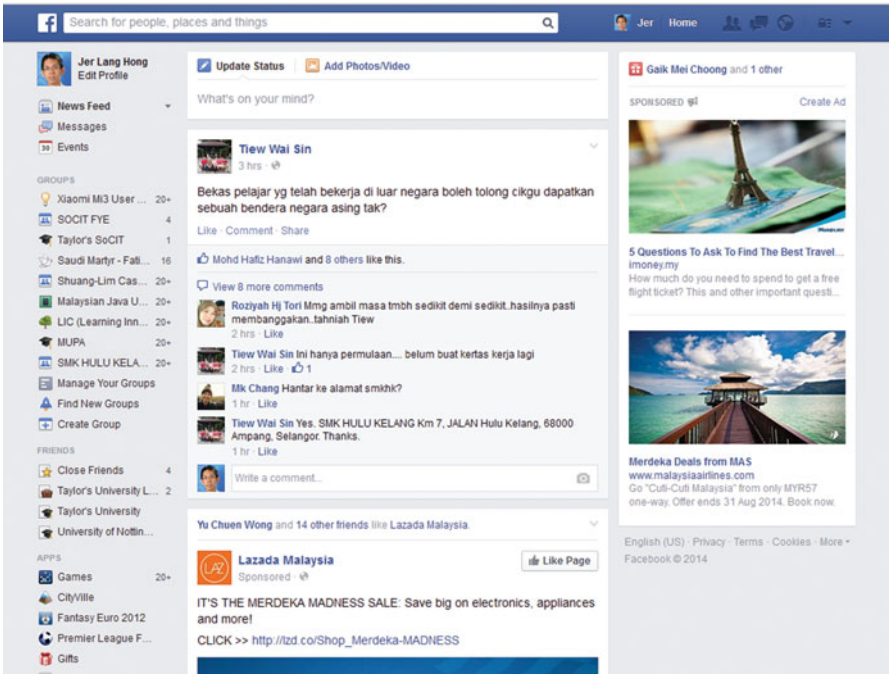

Fig. 1 Facebook example

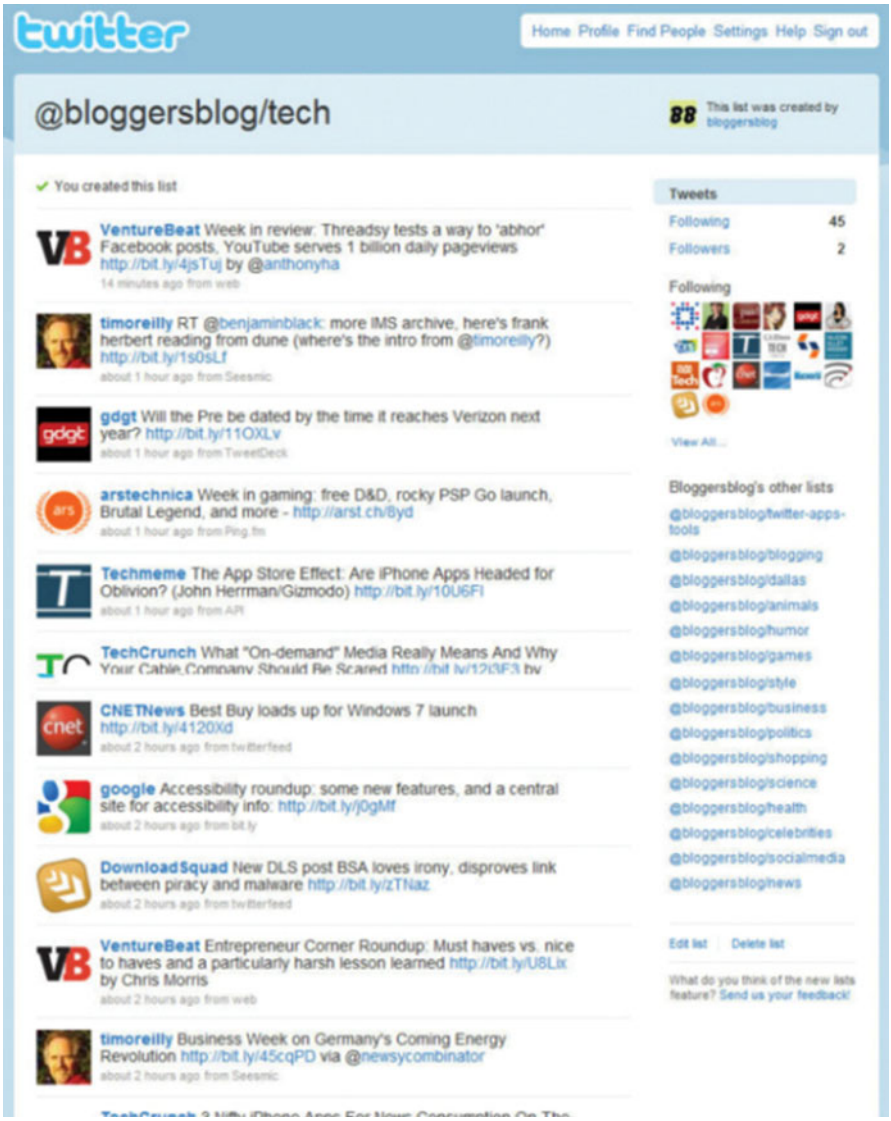

Fig. 2 Twitter example

sheet. This description will be helpful for us to identify the categories the factors are in as stipulated in Table 1. Once the users have completed the survey, the samples and the answer sheets are then taken back for evaluation. Factors that are identified correctly are marked as correct, whereas factors that are incorrectly identified are further evaluated by conducting the survey on different participants to obtain further opinion and analysis. Factors are considered incorrectly identified if more than 75 % of the participants disagree with the marked factors on the original samples. Factors that are correctly identified are factors which have at least 80 % of the participants agreeing on the test survey. Otherwise, these factors are considered subject to user's opinion.

Table 1 Factors identified as influencing a user's action for reading a post

Factor	Description
Relationship status	Attract many users who are curious about other relationship status
Smiley icon	It seems that smiley or angry icons attract users
Animated GIF	Attractive image with animation which diverts user's attention
Highlighted text	The text is specially formatted which draws user attention
Text content	User's written text content
Layout	The webpage layout for displaying contents
Color matching	The use of foreground and background color

Table 2 Gender distribution

Male	Female
50	50

4 Experiments

Once the participants have filled in the questionnaires, we compile the data and formulate it using statistical rules. We group the data according to the participants' background and age group. Tables 2, 3, and 4 summarize the demographics of the participants.

For every factor evaluated, we request the participants to identify whether they agree that the factors are affecting the readability of the post and usage of the system.

The table below summarized our findings (Table 5).

We then evaluate the factors influencing user's interest by social networking sites' tool. The tables below present the statistics by social networking sites' tool (Tables 6, 7, and 8).

As can be seen from the tables presented above, each of these social networking sites has different statistics for the different factors identified. This is due to the factors that these social networking sites have different designs and they are built for different groups of users. It is noticeable that Facebook ranked highly in relationship status, smiley icon, and animated GIF factors. This shows that Facebook is actually a platform for social network, where users tend to use it to make friends, and networking. On the other hand, Twitter scored highly on text-related factors (highlighted text and text content), which indirectly shows that it is a platform where user reads tweets to get an update on current issues rather than knowing other user's profile. Google+ scores highly on animated GIF, smiley icon, highlighted text, and text content. This is due to the fact that Google+ is a content-based social networking platforms, where users get update on current news and issues.

Table 3 Age group classification

Age group	Numbers
20–25	46
25–30	38
30–35	12
35–40	4

Table 4 Number of participants by department

Department	Numbers
School of Computing and IT	25
School of Engineering	15
School of Business	25
School of Biosciences	5
School of Hospitality and Tourism	15
School of Pharmacy	5
School of Architecture	5
School of Communication	5

Table 5 Statistics on factors identified as influencing a user's action for reading a post (general)

Factor	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)
Relationship status	0	0	2	12	86
Smiley icon	0	2	6	25	67
Animated GIF	0	0	4	18	78
Highlighted text	0	4	10	21	65
Text content	0	3	8	43	46
Layout	0	9	8	42	41
Color matching	0	4	5	64	27

Table 6 Statistics on factors identified as influencing a user's action for reading a post (Facebook)

Factor	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)
Relationship status	0	0	0	7	93
Smiley icon	0	0	3	12	85
Animated GIF	0	0	2	9	89
Highlighted text	0	7	8	16	69
Text content	0	2	8	36	54
Layout	0	4	6	38	52
Color matching	0	0	7	27	66

Table 7 Statistics on factors identified as influencing a user's action for reading a post (Twitter)

Factor	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)
Relationship status	0	12	78	10	0
Smiley icon	4	10	9	12	65
Animated GIF	2	7	11	12	68
Highlighted text	9	13	8	18	52
Text content	0	1	7	15	77
Layout	0	7	27	54	12
Color matching	2	18	24	46	10

Table 8 Statistics on factors identified as influencing a user's action for reading a post (Google+)

Factor	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)
Relationship status	5	5	60	6	24
Smiley icon	0	6	21	18	55
Animated GIF	0	0	14	22	64
Highlighted text	2	8	12	25	53
Text content	0	3	7	37	53
Layout	0	9	25	45	21
Color matching	0	8	28	41	23

Twitter scores very low on relationship status; this is particularly due to the fact that the users who tweet online wish to made their opinion known to others, in addition to update their friends on their status. It is certainly not a platform for making friends as in Facebook, rather it is a platform to post short messages so that other followers can update on their friend status. Twitter also scores lowly on layout and color matching. This came as no surprise to us as we find that Twitter website design is purely simple, and it does not contain much information besides tweets. Similar to Twitter, Google+ also scores lowly on relationship status, layout, and color matching. This is particularly due to the fact that Google+ is a platform for discussing certain issues. Also, the low score on layout is also due to the different layouts provided by Google+, which allows user customization. The fact that Google+ allows user customization indirectly results in higher score for other factors. This is because Google+ provides a well-designed template for formatting text and image contents, which is not provided in other social networking sites.

Finally, Facebook scores generally high on all the factors. From the participant feedbacks, we find that Facebook provides many more features compared to the latter two platforms, particularly the relationship status feature. In addition to that, a user is able to find similar information in Facebook compared to the other two platforms; thus, the need for using Google+ and Twitter may not be necessary. We also find that most users generally disagree that color matching in a website design does

affect the readability and use of social networking platforms. This is particularly true as different users have different attractions to certain colors; hence, it may be unwise for a social networking developer to design their website for different groups of users.

5 Conclusion

In this paper, we have studied on the various factors affecting a user's interest in reading a particular post. We have identified several factors in our research study, and among them are images, animated icons, dynamic scripts, and attractive text contents. We have conducted an extensive user study to verify our hypothesis. Experimental test shows that our observation is correct based on the survey results conducted on the test participants. The outcome of our study will be very helpful for the future designer of social networking sites and also researchers working on viral marketing and online poll prediction. We also hope to extend our research study to other social networking sites, such as Pinterest and LinkedIn.

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Academic Performance and Perceptions of Female Students in Civil Engineering

Ni Lar Win and Khin Maung Win

Abstract The gender imbalance in engineering education and engineering workplace has been received worldwide attention. Various efforts are made to find solutions to the inadequate number of women in engineering professions. The underrepresentation of female students is observed in the engineering faculty at a private university in Malaysia. The aims of this study are (1) to observe the involvement of female students in civil engineering degree programme offered in the faculty, (2) to examine the academic performance of female students compared to their male counterparts and (3) to explore the perceptions of female students toward their education. The student progress rate (SPR) is used to measure academic performance of students in the civil engineering degree programme. Student progress rate is defined as the ratio of subjects passed to subjects attempted throughout their studies. The SPR for any student lies between 0 and 100 %. Means of SPR are analysed for the performance of female and male students. This study extends to find out the performance of female students by comparing the percentage of female and male students receiving academic awards given by the university and graduate students' classification. Questionnaire is used for perceptions of female students regarding the role of women in engineering. The study shows that women are good for engineering since female students in civil engineering programme do as well as or better than their counterparts. Female students have positive attitudes toward their education. The result from this study can be used to attract more female students to study in engineering programmes.

Keywords Academic performance • Civil engineering • Female students • Perceptions

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1 Introduction

The gender imbalance in engineering education and engineering workplace has been received worldwide attention. Various efforts are made to find solutions to the inadequate number of women in engineering professions. However, the underrepresentation of female students in engineering in Western countries such as the USA, Canada, the UK and Australia is still observed. According to Engineers Canada (2012), 17.7 % of the total enrolment was female students studying engineering in accredited Canadian programmes in 2011, and the enrolment of female students in civil engineering was 21.8 %. Yoder (2011) reported that the enrolment of female students in undergraduate engineering programmes in 348 US and 11 Canadian engineering colleges was 18.2 % in 2011. Kaspura (2012) stated that the percentage of female engineering students in Australia was steady over the decade, and it was about 16.0 % of the total engineering students.

Studies on gender differences in academic performance in the field of science and engineering have been carried out by many researchers. Orabi (2007) indicated that academic performance is affected by many factors such as motivation, student ability and the quality of secondary education received. He analysed student academic performance by comparing course work scores between the two genders using assignments, projects, exams and class participation. The results showed that there were no significant differences between mean scores in the academic performance of the genders in an introductory engineering course offered in the University of New Haven.

Felder et al. (1995) examined the gender differences in the students' academic performance, persistence in chemical engineering and attitudes toward their education and themselves. They concluded that the women in the study on average entered chemical engineering with credentials equal to or better than those of the men, but exhibited erosion relative to the men in both academic performance and confidence as they progressed through the curriculum.

Chen et al. (2012) carried out the academic performance of female students in mechanical engineering in North Carolina Agricultural and Technical State University. They analysed academic performance by comparing the mean, median and 10th and 90th percentiles of the final marks (combination of course work and final examination marks) of male and female students. They have found that the female students in their study performed better or equally well than the males by all measures.

Arsad et al. (2011) investigated the female academic performance of electrical degree students at the Faculty of Electrical Engineering of Universiti Teknologi MARA, Malaysia, based on the student's entry levels. They concluded that female students performed better than male students due to the strong ability in fundamental engineering foundation and self-efficacy of the female students which greatly influenced the overall academic performance.

Olsen et al. (2006) used student progress rate (SPR) as a key performance indicator to measure academic performance in the Australian universities, while the cumulative grade point average is used to measure the academic performance of students by He and Banham (2009), Oladeji and Sangotayo (2011) and others.

The aims of this study are (1) to observe the involvement of female students in civil engineering degree programme offered in the faculty, (2) to examine the academic performance of female students compared to their male counterparts and (3) to explore the perceptions of female students toward their education.

2 Methodology

This study consists of three parts: analysis of gender balance in civil engineering degree programme, academic performance of female students and perceptions of female students regarding women in engineering. The enrolment of female students in civil engineering degree programme offered from the period of September 2008 to January 2014 (17 semesters) by the faculty is taken for analysis.

The student progress rate (SPR) is used to measure academic performance of students in the civil engineering degree programme. Student progress rate is defined as the ratio of subjects passed to subjects attempted (Olsen et al. 2006). Therefore, the SPR for a student is between 0 and 100 %. In this study, means of SPR are calculated for the comparison of academic performance of male and female students. The university celebrates the ceremony of Academic Award Presentation twice a year for students who excelled in their academic pursuit. The percentage of female students receiving academic awards in the programme is analysed, and performance of graduate students by classification is also observed.

In this study, a questionnaire as an instrument is designed to find out the female student perceptions regarding the role of women in engineering. It includes their backgrounds (demographic information and precollege experiences) and the perceptions: engineering classroom environment (how encouraged or discouraged they were by academic grades, time required for course work), contentment in the engineering major (interest in engineering and happiness with choice of engineering major) and change in self-confidence. It consists of 17 questions and takes about 15–25 min to complete. Some of the questions are extracted from the report written by Goodman et al. (2002) and modified appropriately for this study. Six-point scales (strongly agree, moderately agree, slightly agree, strongly disagree, moderately disagree and slightly disagree) are used in the questionnaires to measure the perception of female students.

3 Results

3.1 Involvement of Female Students

The percentage of male and female students enrolled in civil engineering degree programme from September 2008 to January 2014 session is shown in Fig. 1. It is observed that the percentage of female students ranges from 11 to 22 %. It is currently about 14 % in January 2014 session.

Almost half of the female students are international students. They came from China, Indonesia, Maldives, Mauritius, Sudan and Uganda. The distribution of female students by country is shown in Fig. 2. The highest number of female students came from Mauritius followed by Indonesia.

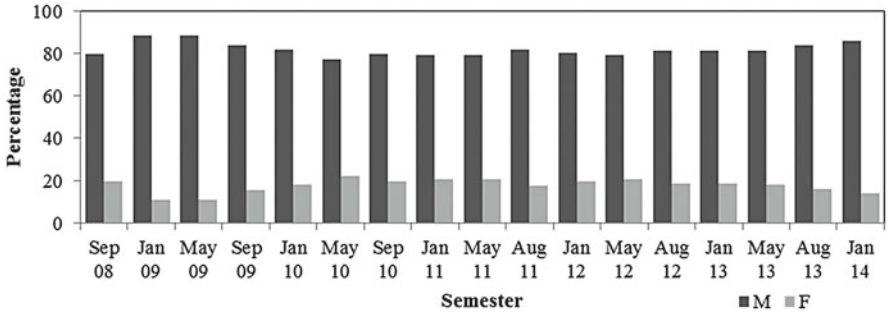

Fig. 1 Percentage of enrolment of male and female students

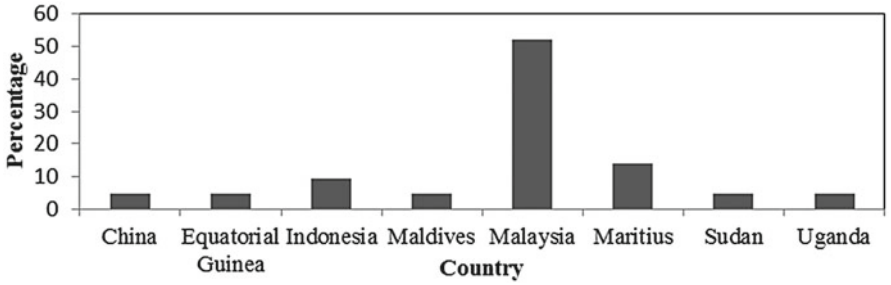

Fig. 2 Distribution of female students by country

3.2 Academic Performance of Female Students

Mean SPR of both male and female students who enrolled in January 2014 session is analysed and is about 86 %. It means that on average, students passed 86 % of the total subjects that they have enrolled in the programme. Mean SPR of male and female students by year and all students (year 1 to year 4) in the programme is shown in Fig. 3. It is observed that the mean SPR of female students in year 3 is 99 %. It means that female students in year 3 passed almost all the subjects that they have attempted. It is observed from Fig. 3 that female students outperformed male students in year 3 and are slightly better in year 4. In overall, female students performed as good as male students since mean SPR for females is 83 % and males is 86 %.

The percentage of male and female students receiving academic award in the degree programme is shown in Fig. 4. Female students performed as well as or better than their counterparts since the percentage of female students receiving academic awards is higher than that of male except in May 2012 session.

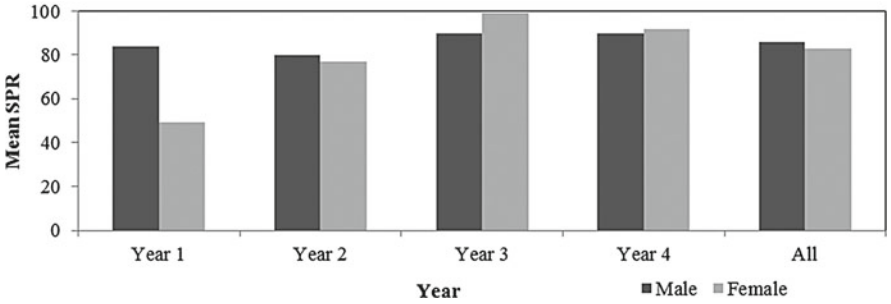

Fig. 3 Mean SPR of male and female students

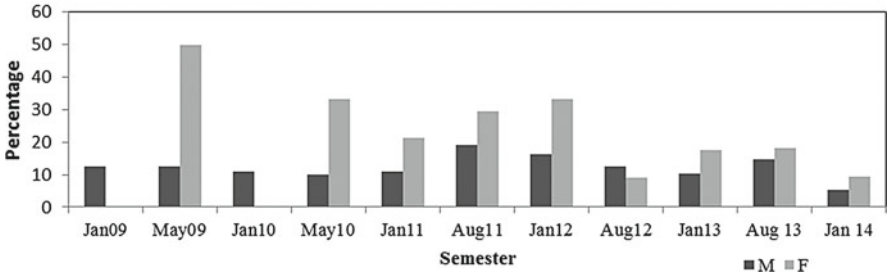

Fig. 4 Percentage of students receiving academic award

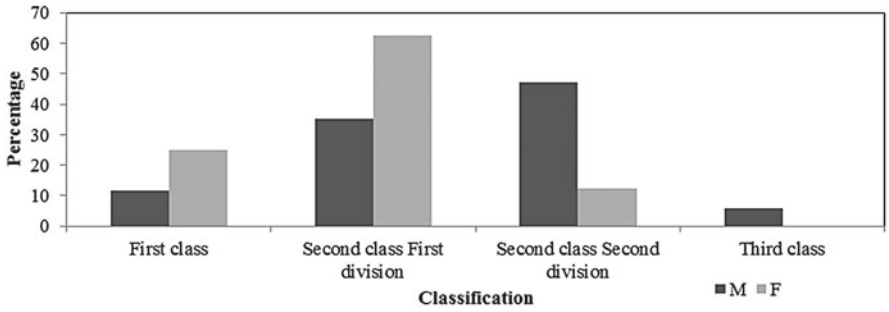

Fig. 5 Performance of graduate students

The performance of graduate students by classification (First Class Honours, Second Class Honours First Division, Second Class Honours Second Division and Third Class honours) is shown in Fig. 5. It is observed that female students outperformed males in First Class Honours and Second Class First Division Honours.

Based on the results shown in Figs. 3, 4 and 5, it is concluded that female students in civil engineering degree programme do well or better than their counterparts. This finding agrees with Win and Win (2013) where mean, median and percentiles of marks are used to measure academic performance. However, the result obtained in this study does not agree with the finding obtained by Felder et al. (1995) and Oladeji and Sangotayo (2011).

3.3 Perceptions of Female Students

Perceptions of female students are analysed from the questionnaire given to the female students in civil engineering. A majority of female respondents were Malaysian (70 %). About 60 % of the respondents were between the ages of 22 and 23, where 25 % were older and 15 % were younger. Before entering engineering degree programme, 60 % of them completed the University Foundation Programme where they took advanced calculus, physics and chemistry. Ninety percent of them have a high level of interest in engineering.

Students are asked to give the reasons why they want to become a civil engineer. The reasons given are the employment opportunities, salary potential, interest in the subject matter in civil engineering and ability to work in the challenging environment. One student answered that one could bring changes and make a difference toward the environment.

All of them were happy with their choice of engineering, and they are confident that engineering is the right major for them. Sixty percent of them would either *definitely* or *probably* encourage other women to major in civil engineering. Forty percent said they *would be neutral so that they would not* encourage or discourage others.

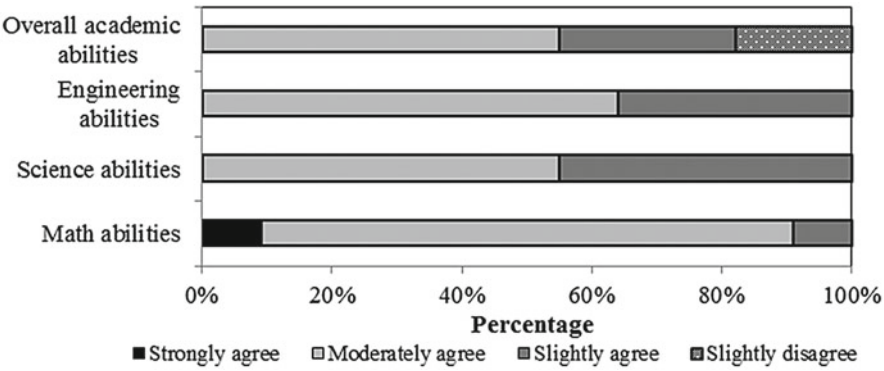

Fig. 6 Change in self-confidence

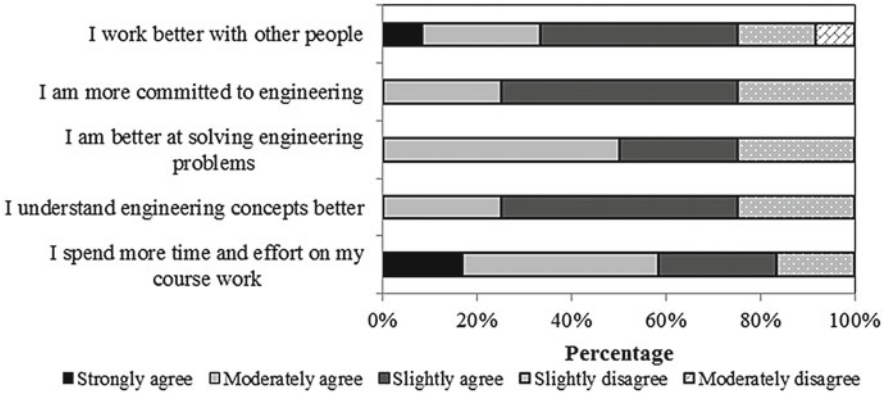

Fig. 7 Perception of female students compared to males in engineering courses

Students were asked whether they agree or disagree that their self-confidence has changed since they entered the engineering programme. It can be seen from Fig. 6 that students agreed that their self-confidence has changed in math, science and engineering abilities (100 %). However, 20 % of the students slightly disagreed in self-confidence changed in overall academic abilities. Eighty percent of them felt that they have more confidence in engineering abilities during their study in engineering. About 70 % of respondents have been elected at least once as a class representative for the specific subject.

In the questionnaire, female students were asked to compare themselves to the male students regarding on engineering courses (see Fig. 7). More than 80 % of students spend more time and effort on their course work. It is observed that they have more confidence in engineering abilities compared to their counterparts.

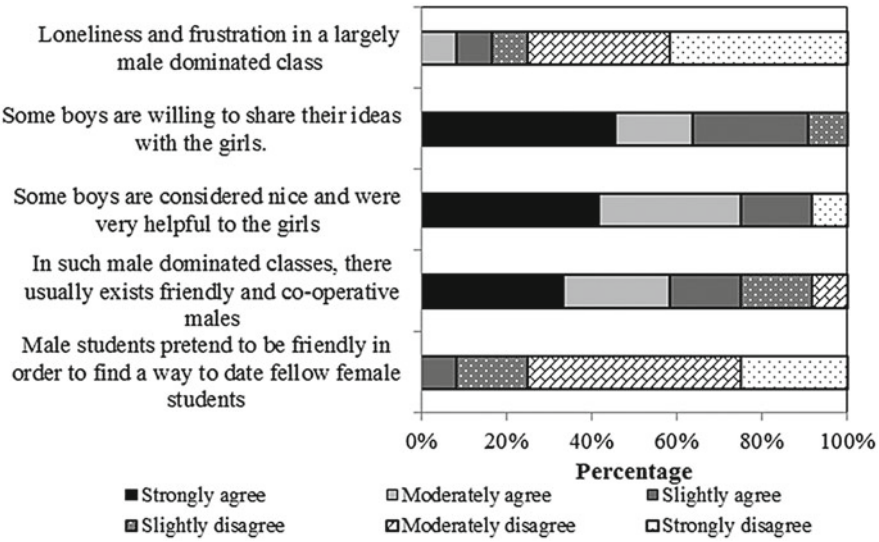

Fig. 8 Experiences with male engineering students

The female students were asked to express whether they have any unpleasant experiences with male engineering students (see Fig. 8). Almost all female students have positive attitudes toward their male counterparts since they considered the males as nice, helpful, friendly, co-operative and willing to share their ideas. Most of the respondents felt that they did not have loneliness and frustration in largely male-dominated classes.

About half of the respondents felt that engineering faculty was supportive of female students. However, about 60 % believed that faculty should have special programmes to address women's needs. Ninety percent of them have positive attitude toward their lecturers.

4 Conclusions

This study has attempted to examine the academic performance and explore the perception of female students in civil engineering degree programme. The conclusions are as follows:

1. Underrepresentation of female students is observed in the faculty since female students make up of 14 % of total students in civil engineering.
2. Female students outperform their male counterparts by all measures.

3. Female students have positive attitude toward their choice for their education and change in self-confidence.
4. Overall perception of female students is encouraging toward the interaction between students and faculty.
5. The result from this study can be used to attract more female students to study in engineering programmes.

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A Study on Academic Performance of International Students

Ni Lar Win, San Dar Wynn, and Khin Maung Win

Abstract As the number of international students studying in both public and private universities in Malaysia increases, there is an increase in the diversity of students' learning styles which may affect their academic achievement. International students may have cultural shock due to cultural differences in both academic and social aspects. Some international students may experience academic difficulties, despite the fact that they have been successful academically in their home countries due to the different teaching and learning environment as compared to their home countries. The aims of this study are (1) to examine the academic performance of international students, (2) to compare the academic performance of international students and Malaysian students (overall as well as by gender) in the selected degree programmes and (3) to explore the experience of international students. Cumulative grade point average (CGPA) is used to measure academic performance of international students and Malaysian students studying in degree programmes in Law and Civil Engineering offered in the university. Questionnaire is used to explore the students' learning experiences. There are differences in the academic performance of Malaysian students and international students. Malaysian students outperform international students, while female students (both Malaysian and international) perform better than or as good as their counterparts in the programmes under study. International students have positive attitude toward interaction with other students, lecturers and faculty, and they are happy with their choice of education. The findings from this study can be used to improve the academic performance of international students in the university.

Keywords Academic performance • International student • Cumulative grade point average

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1 Introduction

As the number of international students studying in both public and private universities in Malaysia increases, there is an increase in the diversity of students' learning styles which may affect their academic achievement.

International students may have cultural shock due to cultural differences in both academic and social aspects. Some international students may experience academic difficulties, despite the fact that they have been successful academically in their home countries due to the different teaching and learning environment as compared to their home countries.

Chong and Mokhtar (2013) investigated learning experience from international students at two private institutions in Malaysia. They concluded that language is only one of the challenges faced by international students who came from the countries where English is not their medium of instruction. The international students found it difficult to adjust their learning in English.

Li et al. (2010) examined the effects of various academic and cultural related factors on academic performance of international students (Chinese and non-Chinese cultural groups) in the School of Management at the University of Surrey. They reported that the perceived significance of learning success to family, proficiency in English and social communication with compatriots was the most significant predictor of academic performance of all international students in their study.

Lovell (2003) studied the academic performance of international students enrolled in the Bachelor of Engineering (electrical) programme at the University of Queensland, Australia. He concluded that the international students perform as well as, if not better than, domestic students using the mean cumulative grade point average.

Olsen (2008) explored the comparative academic performance of international and Australian students in a group of 8 (Go8) universities: the Australian National University, Monash University, the University of Adelaide, the University of Melbourne, the University of New South Wales, the University of Queensland, the University of Sydney and the University of Western Australia. He concluded that international students on campus in Australia did as well as Australian students and did better than international students offshore in terms of student progress rate.

He and Banham (2009) and Nasir (2012) measured academic performance of students in terms of cumulative grade point average (CGPA), while Olsen et al. (2006) used student progress rate (SPR) as a key performance indicator in the Australian university system.

The aims of this study are (1) to examine the academic performance of international students, (2) to compare the academic performance of international students and Malaysian students (overall as well as by gender) in the selected degree programmes and (3) to explore the experience of international students.

2 Methodology

This study consists of three parts: involvement of international students, comparison of academic performance of international and Malaysian students and learning experiences of international students. This study focuses on the students enrolled in Bachelor of Civil Engineering and UK Degree Transfer in Law programmes offered in authors' university for January 2014 session.

Cumulative grade point average (CGPA) is used to measure academic performance of international students and Malaysian students. Means CGPA are calculated for the analysis by study year and by gender. Questionnaire as an instrument is used to explore the students' learning experiences. It includes their backgrounds (demographic information, precollege experiences) and the experiences during their study in the university (interaction with students, lecturers and faculty). It consists of 16 questions and takes about 10–15 min to complete.

3 Results

3.1 Involvement of International Students

The involvement of international students in Civil Engineering and Law programmes offered in the university is about 40 % and 19 %, respectively, in January 2014 session. International students came from 24 countries: Bahrain, Bangladesh, Brunei, China, Egypt, Equatorial Guinea, Fiji, Indonesia, Iran, Iraq, Jordan, Kenya, Lebanon, Maldives, Mauritius, Nigeria, Pakistan, Singapore, Sudan, Syria, Tanzania, Uganda, Yemen and Zimbabwe. The distribution of international students by the most contributing country for both programmes is shown in Fig. 1.

It is observed from Fig. 1 that the highest number of international students studying in both programmes came from Mauritius followed by Indonesia.

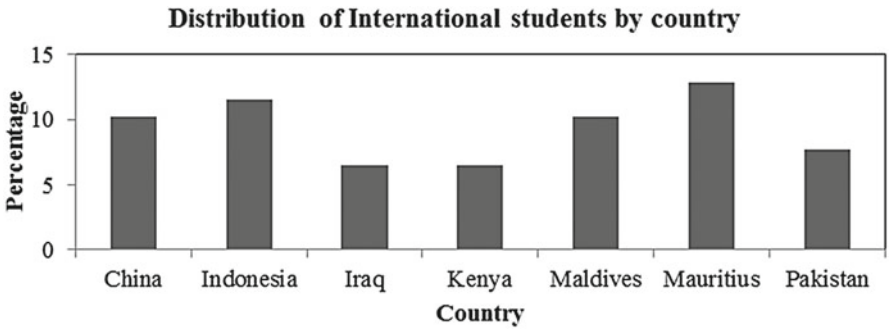

Fig. 1 Distribution of International students by country

3.2 Academic Performance of International Students

Mean CGPA of international students and Malaysian students studying in Civil Engineering and Law programmes in January 2014 session is calculated to measure their academic performance and shown in Table 1. It can be seen from Table 1 that Malaysian students outperform international students in both programmes. This is consistent with the finding in Canada obtained by He and Banham (2009) since their study shows that domestic students' academic performance is generally better than international students' performance.

Mean CGPA of students by study year and all students is calculated for Civil Engineering and Law programmes and shown in Figs. 2 and 3, respectively. It is

Table 1 Comparison of mean CGPA of students

	Civil engineering	Law
International students	2.60	2.18
Malaysian students	2.87	2.72

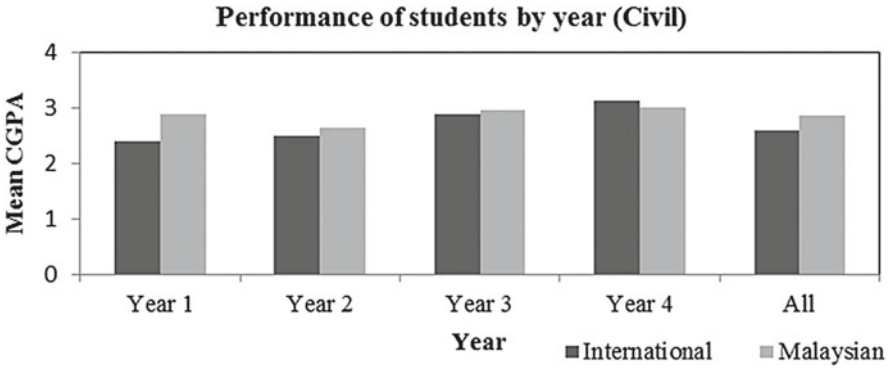

Fig. 2 Academic performance of international and Malaysian students by year (Civil)

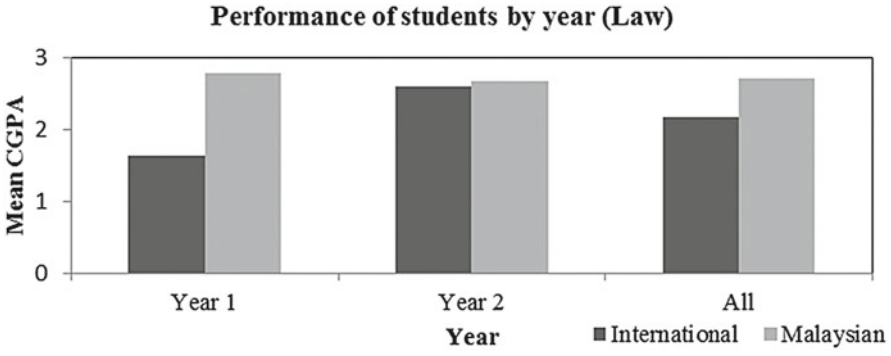

Fig. 3 Academic performance of international and Malaysian students by year (Law)

noted that the duration of Bachelor of Civil Engineering is 4 years, and UK Degree Transfer in Law programme in the university is 2 years. Students studying in Law programme progress their study in UK universities to complete their Bachelor of Law degree.

It is observed from Fig. 2 that the academic performance of Malaysian students in Civil Engineering is better than international students in year 1. However, the performance of international students improves in years 2 and 3, and they are as good as Malaysian students. International students perform slightly better than Malaysian students in year 4.

The same trend for Law programme is observed in Fig. 3. International students may experience academic difficulties in year 1 due to the different learning and teaching environment in Malaysia. Mean CGPA of international students and Malaysian students by gender for both programmes is given in Table 2 and shown in Fig. 4. The involvement of female students is about 14 % of total students in Civil Engineering and is about 58 % of Law students.

It can be seen from Table 2 that international female students outperform international male students in Law, and Malaysian female students outperform Malaysian male students in both programmes. In overall, female students perform better than or as good as their male counterparts in both programmes under study.

It can be seen in Fig. 4 that Malaysian students (both gender) outperform international students in both programmes.

Table 2 Mean CGPA of students by gender

	Civil engineering		Law	
	Female	Male	Female	Male
International	2.40	2.64	2.25	1.88
Malaysian	3.16	2.83	2.75	2.69
All	2.80	2.76	2.62	2.62

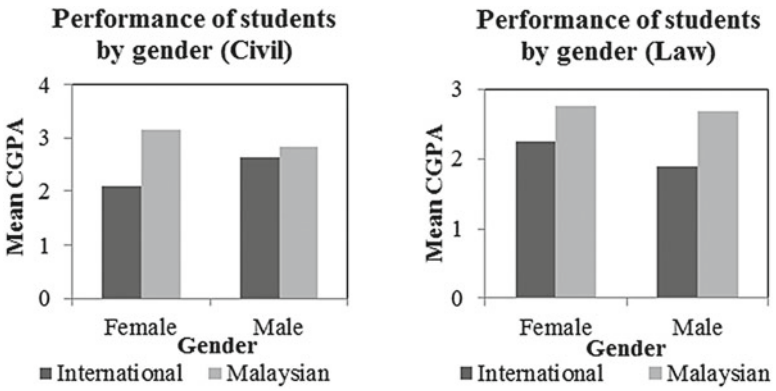

Fig. 4 Academic performance of international and Malaysian students by gender

3.3 Experience of International Students

Questionnaire is given to international students for their experience in the university. The analysis is focused on two programmes together as a whole since only 40 % of international students from Civil Engineering and 44 % from Law responded the questionnaire. Among the respondents, 17 % in Civil Engineering and 86 % in Law are female students. Respondents are from China, Equatorial Guinea, Fiji, Indonesia, Iraq, Kenya, Maldives, Mauritius, Pakistan, Saudi Arabia and Tanzania. About 60 % of the respondents were between the ages of 21 and 23, with which 20 % were older and 20 % were younger. Respondents received Matriculation British 'A' level (52 %), 'O' level (10 %), High School certificate (26 %) and others (12 %).

The majority of respondents (70 %) reported that English is used as medium of teaching in their home country, while Arabic, French, Indonesian, Mandarin and Spanish are used as medium of teaching for the remaining students. About 90 % of respondents do not have any difficulties with English in the university. However, students from China reported that they have difficulties with English since Mandarin is used as medium of teaching in their high school. This is consistent with the finding by Chong and Mokhtar (2013). Thirty five percent of respondents received academic award given by the university at least once since they have enrolled in the programme. About one-third of respondents have been elected as a class representative for the specific subject. Majority of them have participated in the activities (89 %), 70 % have joined Society Club and 50 % participated in sports organised by the faculty or university.

Students are asked to reflect their experiences during their study in the university whether they have advantage or disadvantage in the areas such as interaction with faculty and lecturers compared to Malaysian students (see Fig. 5). Although 7-point scales are used to measure the perception of students in the questionnaire, the analysis of the responses is carried out by taking percentage for advantage (combining

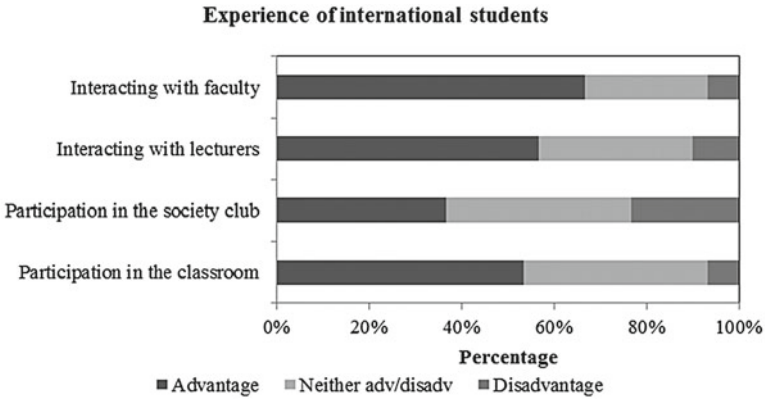

Fig. 5 Experience of international students

great advantage, moderate advantage and slight advantage), neither advantage nor disadvantage and disadvantage (combining great disadvantage, moderate disadvantage and slight disadvantage) to analyse for their experience.

It is observed from Fig. 5 that more than half of the respondents felt that they have advantage in interacting with lecturers and faculty and participating in the classroom compared to Malaysian students. About one-third is neutral in all areas. The majority of the respondents are happy with the interaction with other students, and they have opportunity to learn other's culture. They reported that Malaysian students are friendly since it is easy to make friends with them.

Overall, almost all students are confident that they have made the right major, and they are happy with their choice of their education.

4 Conclusion

This study has attempted to analyse the academic performance of international students in Civil Engineering Degree and UK Degree Transfer in Law programmes and their experience during their study in the university. The conclusions are as follows:

1. Malaysian students outperform international students, while female students (both Malaysian and international) perform better than or as good as their counterparts in the programmes under study.
2. The majority of international students do not have any difficulties with English as medium of teaching in the university.
3. International students have positive attitude toward interaction with other students, lecturers and faculty.
4. Overall, almost all students are happy with their choice of their education.

The findings from this study can be used to improve the academic performance of international students in the university.

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Factors That Affect Students' Mental Health: A Study at Taylor's University School of Hospitality, Tourism and Culinary Arts Final Year Students

Shantini Thuraiselvam and Rui Bao Thang

Abstract *Undergraduates* are often looked upon as the next building blocks in a country's economic growth and development. It is felt that with the growing body of knowledge and hectic pace of technology, the undergraduate student's academic workload and academic stress are increasing. This increase in workload and stress can affect the undergraduate student's mental health. There are limited studies in Malaysia focusing on academic workload and academic stress on the mental well-being among final year students at Taylor's University School of Hospitality, Tourism and Culinary Arts. The aim of this study is to research the relationship between academic workload and student mental health, the relationship between academic stress and student mental health and the perceived level of academic stress. Questionnaires were distributed to 201 final year students at Taylor's University School of Hospitality, Tourism and Culinary Arts. This study could support the university to review the curriculum and adjust the academic workload in order to reduce academic stress among university students. The results of this study hope to assist university management and students to recognise the relationships between academic stress caused by academic workload and student's mental health in the Hospitality, Tourism and Culinary Arts courses. Furthermore, students would realise how academic workload and stress can affect their mental health and recognise symptoms such as poor eating habits, insomnia, depression and suicidal tendencies as consequences of academic stress and encourage them to seek help from mental health professionals.

Keywords Academic workload • Academic stress • Student's mental health

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1 General Introduction

Stress is intangible; it not only affects the individual but others around them including family, friends and colleagues. Everyone has their own perception and receptivity level of stress. According to Martins et al. (2013), stress is called the 'disease of the century', and it is known to interfere with personal interactions and institutional and social activities.

The number of higher education institutions in Malaysia stands at 30 public universities and 25 private universities, as reported by the Malaysian Qualifications Agency (MQA). This has not taken into account the number of international university branch campuses, university colleges, polytechnics and community colleges. Corresponding with the number of higher education institutions is the growing number of students pursuing tertiary education. A glance at the statistics published by the Ministry of Education, from 2002 to 2012, there has been an increase from 576,439 students enrolled in higher education institutions to 976,409 students, which is a whopping increase of 69.4 % over a period of 10 years. There are a number of reasons offered as to why students pursue a bachelor's degree. As indicated by Kim et al. (2002), the top reasons are interest in the type of work, job opportunities, opportunities for self-employment, good match with student abilities and an increase in projected earnings.

In 2006, the Ministry of Health reported an overall prevalence of 11.2 % for psychiatric morbidity among Malaysian adults from The Third National Health and Morbidity Survey. The impact of stress on students is obvious from the large numbers seeking help at student counselling centres in higher education institutions (Naidoo 1999). According to Garlow et al. (2008), 84 % of the students with suicidal ideation and 85 % of the moderately severe to severely depressed students were not receiving any form of psychiatric treatment. The university management and student centres should emphasise these problems and encourage students to seek help in order to cope with the symptoms before it becomes a more serious problem. While Garlow et al.'s (2008) research focused on questions of current suicidal ideation and past suicide attempts and deliberate self-harm, strong and distressing emotional states, alcohol use, drug use, eating behaviour, global functional impairment, current pharmacotherapy and psychotherapy, this study intends to focus on the effect of academic workload and academic stress on the students' mental well-being. One of the factors that contribute towards students withdrawing from the degree programme before the completion of the course, most times at a significant financial cost to the students, is the academic workload (Bowyer 2012).

As stated in the 2014 Ranking Web of Universities, Taylor's University is the 29th of the top universities in Malaysia and an MQA Tier 5 (excellent) SETARA 2011 institution. Taylor's University School of Hospitality, Tourism and Culinary Arts was the only school to have achieved the MQA's Tier 6 (outstanding) rating based on the Discipline-Based Rating System (D-SETARA). The D-SETARA system was developed and implemented to assess by discipline the quality of teaching and learning in higher education institutions in Malaysia. It aims to ensure continuous improvement to the quality and competitiveness of higher learning institutions.

1.1 Research Objectives

The main objectives of this research are to determine the relationship between academic workload and academic stress on the mental health of final year students in the Taylor's University School of Hospitality, Tourism and Culinary Arts (SHTCA). The aim of this study is to show how variables in academic stress and academic workload can be utilised to show effect on the students' mental health. The results from the research can be a valuable data for the university in adjusting the academic workload to reduce academic stress for the students in this programme. Meanwhile, students can recognise the symptoms of academic stress on their mental health and be able to seek professional help. The following are the research questions:

- What is the relationship between academic stress and mental health on Taylor's University SHTCA final year student?
- What is the relationship between academic workload and mental health on Taylor's University SHTCA final year student?

2 Literature Review

2.1 What Is Stress?

While there is no one definition of stress, according to Sutton (2011), it is known as tension or any situation that arouses emotional strain and negative feeling from a person. Stress can come from everywhere and anytime or is the emotional and physical strain caused by the response to pressure from the outside world. Stress is also explained as the body's non-specific response to any demand placed upon it (Jayakumar and Sulthan 2013). The responses may be physical like a headache, or an emotional response such as fear or depression or a behavioural response such as anxiety or worry. A stressor is an environmental element that is perceived by the individual as menacing and mendacious to his or her well-being (Lazarus and Folkman 1984). Some think that zero stress means happy and healthy, but this is wrong. If stress is well-managed, it can make people motivated and productive. If mismanaged, stress can hurt and kill someone.

However, when stress goes beyond the amount which a person is not able to handle, then stress stops being helpful and starts causing damage to health, productivity, relationships and quality of work (Sutton 2011). According to Melvin (2014, p.193), stress can be divided into two factors which are internal and external. External stress appears when the stress comes from outside like environment or event. Melvin (2014, p.193) said that internal factors consist of nutritional status, anticipation, imagination, overall health, memory and fitness levels, emotional well-being, and the amount of rest you get. On the other hand, external factors which affect your capability include the social relationship, familial relationship, physical environment, financial problems and so on. In this study, the research will

focus on the internal stress which is academic stress on student mental health. According to American National Institute for Mental Health, there are four categories of warning signs which are cognitive signs, emotional signs, physical signs and behavioural signs. Cognitive signs are the inability to concentrate, memory problems, negative thinking, poor judgement and constant worrying. The moodiness, feeling overwhelmed, depression and short temper are the emotional signs of stress (Sutton 2011). Examples of physical sign are headaches, constipation, chest pain and dizziness. The behavioural signs include eating more or less, sleeplessness, overdoing activities such as exercising and shopping, developing nervous habits such as nail biting or pacing and using drugs or alcohol to release their stress (Sutton 2011).

2.2 Academic Stress

There have been a number of researches on academic stress. Academic stress is a mental distress with respect to frustration associated with academic failure, apprehension of such failure or even an awareness of the possibility of such failure (Gupta and Khan 1987). According to Berg and Keinan (1986), a significant stressor leading to academic stress was the high self-expectation students impose on themselves. Another study indicated that holding the student under continuous examination and coursework assignments caused academic stress (Clift and Thomas 1983). Furthermore, Kahlon (1993) found that the factors of stress were fear of examination, living up to parental expectation, attitude of the lecturer, lack of parental help and congenial examination system. In addition, Kadapatti and Vijayalaxmi (2012) said that academic stress is a combination of academic-related demands that exceed the adaptive resources available to an individual. Zeidner (1992) found that the students appeared to be under high pressure starting from academic overload and evaluation procedures.

According to Gadzella (1994), academic stress is divided into four parts which are frustration, pressure, changes and self-imposed expectations. For example, when the tuition fee is due and/or assignment or project is needed to be submitted, the student will feel stressful. Coursework overload is when assignments from various subjects, presentations and assessments are due around the same time. Gadzella (1994) mentioned that when students do not have good interpersonal relationships with friends and family, it can also affect their mental well-being.

According to Bean and Hammer (2006), 55 % students have to ignore one subject for the preparation of the other subject, 42.5 % students reported moderate level of stress, whereas in 27 %, the stress level was beyond a manageable level. Jayakumar and Sulthan (2013) have identified the following as common academic stress factors – improper teaching, lack of information to be learnt, competition for scoring marks, frequent examinations, long hours of academic work, barriers in communication, heavy workload, inadequate resources, irregular attendance, dilemma in choosing the discipline and insufficient library facilities. Khan and Ayyub (2013) had identified academic stress as being caused by academic work

being too hard, fear of failing coursework, lack of preparation, fear of presentations, fear of examination, long period of lecture hours and concern regarding their academic ability.

2.3 Academic Stress and Suicidal Ideation

There are strong links between academic stress and suicidal ideation among university students. The examination periods are peak season for suicide cases each year where students perceive a high level of stress (Töero et al. 2001). In the academic world, suicide is considered as a 'pathological behaviour'. In addition to depression, suicidal ideation is a strong predictor of attempted and committed suicide (Obowale et al. 2014). Based on Juon et al. (1994) study, they found that students who have experienced a high level of academic stress were more likely to think about suicide rather than those students who did not experience academic stress. Based on Westefeld et al. (2005) study which has investigated 1,800 students at four universities, there are 24 % of college students who had seriously considered suicide when in college, and 5 % had attempted suicide when in college. The suicidal behaviour is based on psychological, social and environmental factor. In Singapore, Ho Kong Wai (1999) noted that the reasons for suicide attempts were conflicts with family members (24.5 %); conflicts in interpersonal relationships with, for example, spouse, parents, siblings and friends (23.6 %); problems at school (11.0 %); work stress (2.4 %); and financial difficulties (1.0 %). Interestingly, drug and alcohol abuse was diagnosed in only 0.5 % of the cases.

2.4 Academic Stress and Depression

Ibrahim et al. (2013) identified 24 articles that met the criteria for inclusion in their study of depression prevalence among university students. They found that university students experienced rates of depression that are substantially higher than those found in the general population. Recent reviews on depression among students have also found that depressive mood is linked with low academic achievement or academic problems (Kaslow et al. 1984). One of the most popular mental disorders is depressive disorder. Undergraduate students are at a challenging period of their lives, making life-changing decisions about their education which can affect their future. A study conducted by Mackenzie et al. (2011) found that depression and other mental health disorders are a significant public health problem on college campuses. Many students experience their first psychiatric episode while at college, and 12–18 % of students have a diagnosable mental illness (as cited by Mackenzie et al. 2011; Mowbray et al. 2006). Epidemiological studies suggest that the 15–21 age category (typical college years) has the highest past-year prevalence rate of mental illness at 39 %.

2.5 Students' Mental Health

Mental health problem has become the most common and significant problem among the student population compared with the general population. University students are thought to be prone to high-level stressors due to the transition to university life and a need for scholastic success (Bitsika et al. 2010). Some common mental health problems as explained by various literatures are lack of sleep (Hicks et al. 1990, 2001), bipolar disorder (NIMH 2010) and eating disorders (Jennings et al. 2006; Madanat et al. 2006).

2.6 Academic Workload

It is essential to understand the factors of stress level in the students' life especially the academic workload which is frequently misunderstood. In order to graduate, the student needs to take up a full load of rigorous classes. The relationships of workload and health have been investigated by many researchers using various study designs and methodological approaches. Bowyer (2012) suggests that study workload consists of the time needed for contact and independent study, the type and timing of assessments (see Table 1), the quantity and level of difficulty of the work, the institutional factors such as teaching and resources and student characteristics such as motivation and effort. According to Kausar (2010), an average weekly basis such as lecture hours, study hours during semester, time spent in library, doing

Table 1 Level of difficulty of different types of assessment

Type	Level of difficulty	Reason
Open-book MC test	1	Requires little to no immediate knowledge of materials. There is no memorisation or internalisation or it is inherently easy. The most assistance is available to students. Can sometimes get assistance from others
Written assignment		
Take-home test		
Closed-book MC test	2	Requires knowledge of materials but only minor memorisation. Students can score by guessing correctly in MC tests even without knowledge. Assistance by materials and luck is available to the student
Open-book test/exam		
Aids allowed, e.g. some notes or charts, etc.	3	Requires immediate knowledge of materials with usually only minor assistance from the aids allowed. Requires reasonable amounts of memorisation. Some assistance is available from the aids allowed
Closed-book tests/ exams	4	Requires the highest level of immediate knowledge and memorisation, usually of a reasonable amount of information. No assistance is available

Source: Bowyer (2012). A model of student workload
MC Multiple choice test

assignment at home, finding information and meeting academic demands has been assessed as academic workload. In this study, the researcher divides the academic work to assignment, presentation, test or quiz, examination, lecture hours, events and activities which are academically related.

The majority of the students do experience changes in the level of workload and stress over the semester with a definite link between their reported levels of stress and workload on the week of semester (Lindsay and Rogers 2010). According to the Lindsay and Rogers (2010) study, around 40 % of students studying 5 h and less report less than usual stress levels; around 20 % of students studying 10–20 h report less than usual stress level, whereas this proportion is around 10 % for the categories of students who are studying 21 h and above. The students who felt more stressful than normal are related with the hours of studied per week. About 20 % of students who studied more than 15 h per week reported being more stressed than usual (Lindsay and Rogers 2010). Based on this study, the researcher realises that the students who are studying less hours have less stress than the students who are studying more hours.

According to Ong and Cheong (2009), academic stressors topped the list at 63 %, and the overall top five reported stressors were workload, too many tests, CPGA, course difficulty and lecturer characteristic. Each course has a certain amount of credits which also is student workload. According to the Taylor's University SHTCA, there are five to six subjects in the final semester. There are at least three assignments per subject. Most of the subjects have a midterm and final examination. Besides that, in the final year, students are required to submit their 40-page dissertation in the final semester. According to Taylor's University's rules and regulations, if the students' attendance falls below 80 % per subject, he or she can be barred from the subject's final examination.

2.7 Hypotheses

There are eight hypotheses in this study which are as follows:

H_{1a}: There is a relationship between frustration (academic stress) and mental health of Taylor's University SHTCA final year students.

H_{1b}: There is a relationship between pressure (academic stress) and mental health of Taylor's University SHTCA final year students.

H_{1c}: There is a relationship between changes (academic stress) and mental health of Taylor's University SHTCA final year students.

H_{1d}: There is a relationship between self-imposed expectation (academic stress) and mental health of Taylor's University SHTCA final year students.

H_{2a}: There is a relationship between long lecture hours (academic workload) and mental health of Taylor's University SHTCA final year students.

H_{2b}: There is a relationship between the difficulty of task (academic workload) and mental health of Taylor's University SHTCA final year students.

H_{2c}: There is a relationship between long self-study hours (academic workload) and mental health of Taylor's University SHTCA final year students.

H_{2d}: There is a relationship between too many school activities (academic workload) and student mental health of Taylor's University SHTCA final year students.

3 Methodology and Instrumentation

Based on the literature, this study is using four variables for academic stress which are frustration, pressure, changes and self-imposed expectation that affect the student mental health. In addition, there are also four variables to measure academic workload that have the most impact on students' mental health; these are long period of lecture hours, difficulty of task, long study hours and too many school activities.

In this study, the quantitative method is applied based on the positivism paradigm. During the analysis, the validity has been tested; thus, the result of findings and analyses is accurate and reliable. The eight items used to measure academic stress and academic workload on students' mental health all had high reliabilities, all Cronbach's $\alpha = .861$. The close-ended and open-ended question has been utilised in the questionnaire. The purpose is to collect the information and data for this study. The questionnaire is scientific, and most of the questions are multiple choice. It is convenient for the student to fill in and encourages better responses. This study was conducted at Taylor's University Lakeside Campus. The researcher selected the respondents conveniently as long as they are final year students at Taylor's University SHTCA. The survey was distributed through email, Facebook and pen-and-paper questionnaires to the final year students. There are 263 final year students at SHTCA, and the researcher received 201 usable responses for a 76 % response rate.

3.1 Results and Discussion

In Table 2, there is a summary of the sample demographics. Most of the respondents were male (55 %), from the Hospitality bachelor's degree programme (57 %) and below the age of 26 (97 %). The respondents were mainly Malaysians (60 %), and 75 % of the total respondents had a decent CGPA score of above 2.5.

In Table 3 is the mean response for academic stress caused by frustration where the highest mean was for reasons that prevented them from reaching their academic goals. Pressure was mainly due to deadlines set for assignments and even meeting the due date for the payment of tuition fees. The respondents had high self-imposed expectations; they seemed quite competitive for academic results. The variables for changes did not seem as important as the other three variables by scoring the lowest mean.

Table 2 Profile of respondents ($n = 201$)

Factors	Category	Results
Gender	Male	88 (44 %)
	Female	113 (56 %)
School	Hospitality	114 (57 %)
	Tourism	36 (18 %)
	Culinary arts	48 (24 %)
Age	≤20	118 (59 %)
	21–23	68 (34 %)
	24–26	80 (4 %)
	≥27	60 (3 %)
Nationality	Local	121 (60 %)
	International	80 (40 %)
CGPA	4	0 (0 %)
	3.5–3.999	68 (34 %)
	3.0–3.499	82 (41 %)
	2.5–2.999	44 (22 %)
	2.0–2.499	4 (2 %)
	<2.0	0 (0 %)

Table 3 Academic stress

Academic stress	Mean	SD
Frustration		
I have experienced frustrations due to delays in reaching my academic goals	3.89	0.861
I have experienced daily hassles which affected me in reaching my goals	3.89	0.907
I have experienced lack of financial resources	3.84	1.009
I feel I was denied of opportunities in spite of my qualifications	3.84	0.811
I have experienced failures in accomplishing the goals that I set	3.80	0.927
Pressure		
Due to deadlines (paper due, tuition due, etc.)	4.17	0.851
Due to an overload (attempting too many things at one time)	4.05	0.844
As a result of competition (on grades, work, relationships with spouse and/or friends)	4.02	1.017
Due to interpersonal relationships (family and/or friends, expectation, work responsibilities)	3.43	1.134
Changes		
Rapid unpleasant changes	3.49	1.087
Too many changes occurring at the same time	3.40	1.026
Changes which disrupted my life and/or goals	3.31	0.998
Self-imposed		
I like to compete and win	3.79	0.943
I feel I must find a perfect solution to the problems I undertake	3.77	0.926
I like to be noticed and be loved by all	3.68	0.980
I worry and get anxious about taking tests	3.60	1.068

In Table 4, the respondent's mental health was affected by poor sleeping habits and depression caused by academic stress. Respondents also reported that their tempers became worse and felt that nobody cared for them due to academic stress. Some indicated either a weight gain or weight loss or consuming more coffee, alcohol and energy drinks. Very few respondents indicated that they smoked more or had suicidal thoughts.

In Table 5, the academic workload was measured by the number of subjects, lecture hours, self-study hours and the amount time spent on practical activities. The vast majority of respondents had between five and six subjects (87 %), 11–15 h of lectures per week (93 %), 6–15 h of self-study (76 %) and about 4–6 h of events to attend in the semester (52 %). Most of the respondents felt that the academic workload was heavy and very heavy (86 %) and that the tasks set were difficult and very difficult (84 %). Despite this, it is encouraging to note that the respondents who felt that they had fair to excellent general mental health were an overwhelming 98 %. The students mainly suffered from insomnia (62 %) and depression (68 %). Looking at the combination of insomnia, eating problems, depression and bad temper, 4.5 % reported having none of these problems, one problem (21 %), a combination of two problems (35 %), three problems (28 %) and all the problems (10 %).

The questionnaire contained an optional open-ended question of how the students coped with academic stress. At a glance, music seemed to have a calming effect whether it was listening to music, enjoying a karaoke session or dancing to it. Another favourite method was light exercise (jogging, going to the gym, swimming) and playing games like badminton or team sports, followed by watching television or going to see a movie. Many also indicated socialising with friends and shopping helped to reduce academic stress.

The multiple regression analysis results for the research population (sample size $n = 201$) using Gadzella's (1994) Student Life Stress Inventory (SLSI) measures are presented in Table 6. The three variables, pressure, changes and frustration, are predictors for students' mental health. On the other hand, the research results reject the study's prediction that self-imposed expectations are a predictor of students' mental health among the students of Taylor's University SHTCA.

The pressure score is the main factor which significantly [$F\ (1,199) = 86.58$, $p < .05$] contributes 30.3 % of the variance ($R^2 = .300$) in the students' mental health

Table 4 Students' mental health

Students' mental health	Mean	SD
I am tired and sleeping more/less than normal due to academic stress	3.94	0.909
I feel sad/depressed due to academic stress	3.93	0.974
My temper becomes worse than usual due to academic stress	3.79	1.033
I feel nobody cares for me due to academic stress	3.59	1.202
I have gained/lost weight due to academic stress	3.54	1.237
I do drink more coffee/alcohol/energy drink due to academic stress	3.26	1.202
I do smoke more than usual due to academic stress	2.30	1.354
I attempted to kill myself due to academic stress	1.95	1.254

Table 5 Academic workload ($n = 201$)

Factors	Categories	Results
Total number of subjects in the final semester	≤4	3 (2 %)
	5	21 (10 %)
	6	155 (77 %)
	≥7	22 (11 %)
Total number of lecture hours per week	≤10	8 (4 %)
	11–15	44 (22 %)
	16–20	143 (71 %)
	≥21	6 (3 %)
Total number of hours for self-study per week	≤5	30 (15 %)
	6–10	47 (23 %)
	11–15	106 (53 %)
	≥16	18 (9 %)
Total number of hours spent on academic activities per semester	≤3	84 (42 %)
	4–6	104 (52 %)
	≥7	13 (6 %)
Perceived academic workload	Very light	0 (0 %)
	Light	3 (2 %)
	Normal	25 (12 %)
	Heavy	101 (50 %)
	Very heavy	72 (36 %)
Difficulty of tasks	Very easy	0 (0 %)
	Easy	1 (0.5 %)
	Normal	32 (16 %)
	Difficult	72 (36 %)
	Very difficult	96 (48 %)
Perceived general mental health	Bad	3 (2 %)
	Fair	29 (14 %)
	Good	65 (33 %)
	Very good	76 (37 %)
	Excellent	28 (14 %)
Have you had any of the following problems with your academic workload as a result of your mental health? (can select more than one answer)	Insomnia	125 (62 %)
	Eating problems	90 (45 %)
	Depressed/sad	136 (68 %)
	Bad temper	90 (45 %)
	No problems	9 (5 %)
	One problem	43 (21 %)
	Two problems	71 (35 %)
	Three problems	57 (28 %)
	Four problems	21 (10 %)

Table 6 Gadzella's (1994) SLSI and students' mental health

	Unstandardised coefficients		Standardised coefficients		
	B	Std. error	Beta	t	Sig.
(Constant)	1.695	2.458		.689	.491
Pressure	.701	.153	.323	4.595	.000
Changes	.471	.142	.210	3.307	.001
Self-imposed	−.016	.129	−.007	−.121	.904
Frustration	.470	.143	.251	3.300	.001

[a]Dependent variable: TotalSMH

Table 7 Academic workload and students' mental health

	Unstandardised coefficients		Standardised coefficients		
	B	Std. error	Beta	t	Sig.
(Constant)	6.433	1.345		4.784	.000
Long self-study hours	.320	.149	.168	2.152	.033
Many school activities	.391	.121	.216	3.238	.001
Difficulty of tasks	.312	.164	.164	1.902	.059
Long lecture hours	.563	.162	.299	3.473	.001

[a]Dependent variable: TotalSMH

score. This means that the pressure ($\beta = .323$, $p < .05$) the students felt from competition and pressure felt from deadlines for assignments, presentation, etc. affect students' mental health the most. The combination of pressure and frustration ($\beta = .249$, $p < .05$) accounts for 6.9 % change of the variance ($R^2 = .372$) in students' mental health [$F(2,198) = 58.70$, $p < .05$). However, changes caused by too many things happening at once or due to interpersonal relationships do not contribute much to students' mental health because changes ($\beta = .209$, $p < .05$) only account for 3.4 % change of variance ($R^2 = .406$) in students' mental health [$F(3,197) = 44.861$, $p < .5$)].

The multiple regression model for academic stress is as follows:

$$\text{Students' mental health} = .323(\text{pressure}) + .249(\text{frustration}) + .209(\text{changes})$$

Table 7 shows the results from academic workload on students' mental health. The three variables, long lecture hours, too many school activities and long self-study hours, are significant to the students' mental health. However, the research results showed the difficulty of tasks such as difficulty in completing assignments and assessment did not contribute significantly to their academic workload.

Long lecture hours is the main factor which significantly [$F(1,199) = 169.043$, $p < .05$] contributes 45.9 % of the variance ($R^2 = .457$) of the students' mental health score. This means long lecture hours ($\beta = .394$, $p < .05$) is the main reason the students feel tired, sad, depressed, have poor eating habits and suicidal ideation. The combination of long lecture hours and too many school activities ($\beta = .218$, $p < .05$)

accounts for 5.3 % change of the variance ($R2 = .510$) in students' mental health [$F(2,198) = 105.154$, $p < .05$). However, long study hours does not contribute much to students' mental health because long study hours ($\beta = .217$, $p < .05$) only accounts for 1.8 % change of variance ($R^2 = .528$) in students' mental health [$F(3,197) = 75.637$, $p < .5$)].

The multiple regression model for academic workload is as follows:

$$\text{Students' mental health} = .394(\text{long lecture hours}) + .218(\text{too many school activities}) + .217(\text{long self} - \text{study hours})$$

Based on the findings and analysis above, H_{1a}, H_{1b}, H_{1c}, H_{2a}, H_{2b} and H_{2c} are not rejected. There is a significant relationship between frustration, pressure, changes, long lecture hours, long self-study and too many school activities on the mental well-being of Taylor's University SHTCA final year students. The study does not accept self-imposed expectations and difficulty of tasks as having a significant relationship on the mental health of the students.

The result that self-imposed expectations were not significant disagrees with Berg and Keinan's (1986) results where self-imposed expectations are a stressor to academic stress. Factors such as long lecture hours support findings by Khan and Ayyub (2013).

3.2 Conclusion

These results contribute to existing research on academic stress and academic workload. The respondents, who are students of SHTCA, felt a significant level of frustration, pressure and stress from changes as well as a heavy academic workload; many had successfully used their preferred coping mechanisms such as music, sports and shopping as ways to reduce the stress and achieve a fair to excellent mental health. A possible outcome of this study is to encourage university management to review the number of subjects required, the number of lecture hours and the workload resulting from various assignments, presentations and assessments and still be able to fulfil the conditions set by MQA for a degree programme. Alternative forms of teaching such as blended learning initiatives vigorously undertaken by the schools at Taylor's University could provide an alternative to long lecture hours.

3.3 Directions for Further Research

Taylor's University management can highlight what are some common symptoms of negative academic stress and heavy academic workload and encourage students to visit the Counselling and Psychological Services Centre (CPSC) on campus. The CPSC offers a friendly ear whether the student is lagging behind in studies,

experiencing difficulties in adjusting to campus life or feeling lonely. The counsellors offer some coping skills such as time management, handling relationship breakups, overcoming examination anxiety and other skills to cope with a variety of issues affecting student's mental well-being.

To obtain more information, the research can be expanded to include other schools such as business, mass communication, design school, computing and law at Taylor's University or even other public universities. Lastly, future research could utilise qualitative methods with quantitative methods to get better insight of the results.

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Understanding Students' Acceptance and Adoption of Web 2.0 Interactive EduTools

Azizul Yadi Yaakop

Abstract In recent years, web-based interactive learning tools have gained significant recognition in Malaysia's public and private universities. Like any other Internet-based systems, the adoption requires a solid understanding of user acceptance process. In Malaysia, however, the knowledge of users' behavior toward web-based interactive learning is somewhat limited but is fundamental and essential as part of employing the system in the classroom. This study was conducted to examine students' behavioral intention to use web-based interactive learning tools and analyze the Technology Acceptance Model (TAM). In this paper, the authors present the findings from a quantitative survey of 174 respondents and focus on student responses to perceived usefulness (PU), perceived ease of use (PEOU), attitudes toward usage (ATU), and behavioral intention to use (BIU) web-based interactive learning tools. All hypotheses are supported. A closer look at the constructs reveals a full mediating role of attitude toward usage (ATU) between perceived ease of use (PEOU) and behavioral intention to use (BIU). The findings suggest that TAM can be applied legitimately in the context of determining students' behavioral intention to use web-based interactive learning tools.

Keywords Web-based learning • TAM • Web-based interactive learning tools

1 Introduction

The use of the Internet for teaching and learning, particularly Web 2.0 EduTools, has received increasing attention over the recent years. There are a few push factors, which have made the role of web-based interactive learning indispensible.

Among others, this trend is related to the increase in advance information technology and Internet bandwidth supported by a proper well-planned and conducive e-learning environment. Mitra and Steffensmeier (2000) found that there is a

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positive correlation between students' attitudes toward computers in general and a computer-enriched learning environment. Other push factors that may shape this trend include students' demographic factors, educational delivery market, and innovation technology itself (Concannon et al. 2005).

In Universiti Malaysia Terengganu (UMT), one of its missions is to produce graduates who are sensitive to the idea of management, responsive to change, and become role models to fellow students and the wider community. Among a few approaches to achieving this mission is to exploit the interactive learning experience. Academic faculty have a growing interest in integrating Internet-based technologies into their classroom environments together with more conventional teaching approaches as part of an enriched learning environment. However, there are barriers to the integration of technology into higher education, such as technology infrastructure, faculty effort, technology satisfaction, and graduates' competency (Surry et al. 2005). These barriers could lead to frustration among academic faculty and students in their goal of exploiting the potential of web-based learning. Prior to identification of the problems encountered by UMT in implementing effective web-based interactive learning, this paper reports on a preliminary exploratory study which seeks to understand students' acceptance and adoption to this new approach.

2 Literature Review

The use of web-based interactive learning is not only to provide an alternative platform for teaching and learning but most importantly to improve the learning experience and teaching effectiveness. McArthur et al. (2003) believe that the use of online functions enhances more traditional teacher-centered approaches. Some studies even show that students involved in e-learning outperform those in more traditional classes (Kenkonen-Moneta and Moneta 2002; Hoffman 2002). Nanayakkara (2007) argues that release time, ease of use, perceived usefulness, training and support, and reliability are the five most essential factors for e-learning systems' success. Though web-based learning is increasingly common in tertiary education, Smith and Rupp (2004) and Hill (2000) suggest that new users who first receive web-based instruction might also have the need for more initial training and more feedback. When technology is used in the classroom, it needs to be relevant and appropriate; otherwise, it can become a barrier to learning (Kingsley 2007). Although it is very clear that the use of web-based interactive learning tools is on the rise, there is still little research that has been conducted to verify students' adoption and acceptance toward this technology, especially among Asian students, such as those in Malaysia. Yi and Hwang (2003) argued that identifying the critical factors related to user acceptance of technology continues to be an important issue considering the growing reliance on information systems and increasing rapidity of the introduction of new technologies into learning environment.

The application of the Technology Acceptance Model (TAM) (Davis 1989) to increase understanding of the conceptual issues, and the facilitators to the use of web-based interactive learning tools in higher education, seems an appropriate and

timely step to take. The use of the TAM is also predicated on the assumption that individuals are having control over whether or not they use the tools (Pearlson and Saunders 2006). The TAM is based on the assumption that behavioral intention is formed as a result of conscious decision-making processes (Venkatesh et al. 2003). The factors widely accepted and used in the model are, namely, perceived usefulness (PU), perceived ease of use (PEOU), and attitude toward usage (ATU) (Ajzen and Fishbein 2000; Davis 1989). Other dimensions commonly used include perceived website quality (PWC), computer self-efficacy and attitudes toward web-based interactive learning (AT), the user's skills and capabilities, and the user's beliefs and attitude toward the tools (Davis 1989; Gao 2005; Ma and Liu 2005; McKinnon and Igonor 2008). The behavioral intention to use (BIU) is an important factor that determines whether users will actually utilize the tools.

Some questions need to be answered by the end of the study, inter alia:

1. Can the Technology Acceptance Model (TAM) be used as an integrated theoretical model to explain students' intention to use web-based interactive learning tools?
2. What are the main constructs that influence students' intention to use web-based interactive learning tools?
3. What is the order of importance of these constructs?
4. How can these findings benefit the educators?

3 Research Model and Hypotheses

This study relies on an integrated theoretical framework of students' web-based interactive learning tools acceptance and intention to use based mainly on the Technology Acceptance Model (TAM). The objectives of the study are to analyze the relationship between students' intention to use web-based interactive tools and the following constructs, perceived usefulness (PU), perceived ease of use (PEOU), and attitude toward the usage (ATU), that would provide faculties and lecturers with implications for better implementing web-based interactive learning. The definitions of the constructs are presented in Table 1.

Table 1 Definition of the constructs

No.	Construct	Definition
1.	Perceived usefulness (PU)	The degree to which an individual believes that using web-based interactive learning tools would enhance his or her performance in the course
2.	Perceived ease of use (PEOU)	The degree to which an individual believes that using the system would be free of cognitive effort
3.	Attitude toward usage (ATU)	The evaluative effect of positive or negative feeling of individuals in performing a particular behavior
4.	Behavioral intention to use (BIU)	Individual's intention to use web-based interactive tools

Source: Shroff et al. (2011), Ajzen and Fishbein (2000)

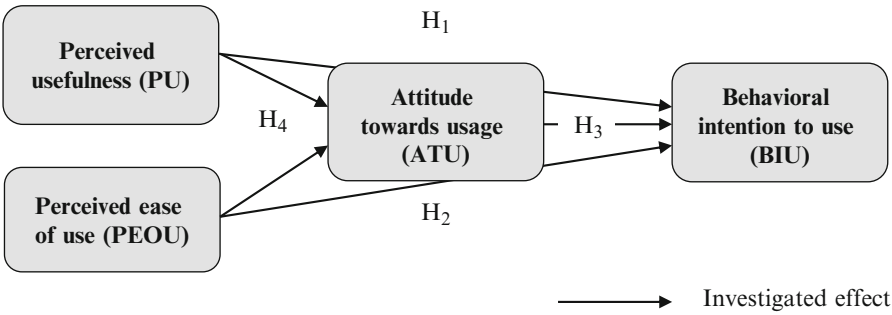

Fig. 1 A conceptual framework of behavioral intention to use web-based interactive learning tools

TAM is based on the view that the actual usage of the system is determined by the users' behavioral intention to use the system, which is determined by the users' attitudes toward using the system and their perceived usefulness and ease of use of the system (Davis et al. 1989). Based on these underlying assumptions suggested by TAM, the authors of this study tested the following hypotheses:

H_1: Perceived usefulness (PU) is a significant predictor of behavioral intention to use (BIU).
H_2: Perceived ease of use (PEOU) is a significant predictor of behavioral intention to use (BIU).
H_3: Attitude toward usage (ATU) is a significant predictor of behavioral intention to use (BIU).
H_4: Attitude toward usage (ATU) is a mediator in the relationship between PU, PEOU, and BIU.

From Fig. 1, this conceptual framework incorporates perceived usefulness (PU), perceived ease of use (PEOU), and attitude toward usage (ATU) as the observed factors for behavioral intention to use (BIU).

4 Research Methodology

A purposive sampling method is used in this study because the scope is limited to students who attended Marketing Communication and Tourism Marketing courses during semester 2, session 2013/2014 in Universiti Malaysia Terengganu (UMT). During the semester, these two courses employed interactive lectures via Web 2.0 EduTools like *blendspace.com*, *voicethread.com*, and *padlet.com*. The total of 174 ($N = 174$) undergraduate students enrolled on the modules constituted a sufficient pool of available subjects, who fit well within the context and purpose of this study. All students participated in the survey. The courses ran from February until May 2013 over a period of approximately 14 weeks.

This study is a quantitative survey study based on a questionnaire which consists of two sections and was distributed at the end of the courses. Section 1 aims to

gather the sociodemographic background of each respondent. There are seven questions regarding the sociodemographic profiles of respondents such as gender, bachelor program, and respondents' level of knowledge and experience with web-based interactive lecture. Meanwhile, Sect. 2 of the questionnaire consists of questions related to variables measuring TAM. The data collected was coded and recorded in SPSS for descriptive statistical analyses. In order to test the hypotheses, post hoc analysis was carried out via hierarchical multiple regression.

5 Findings

5.1 Descriptive Statistics

The respondents' demographic characteristics are presented in Table 3.

The descriptive statistics of the four constructs are shown in Table 2. All means are above the midpoint of 3.00. The standard deviations range from 0.78 to 0.90 indicating a narrow spread around the mean.

5.2 Hypothesis Testing: Post Hoc Analysis

In general, a mediation relationship is proposed because it demonstrates a causal chain that takes place among events (variables). This sequential effect describes how and why such association occurs. In this study, the main focus is the mediating

Table 2 Summary of means and standard deviations ($N = 174$)

Constructs	Questions	Mean	Std. Dev
Perceived usefulness (PU)	Q4	3.28	0.84
	Q8	3.37	0.85
	Q10	3.33	0.79
	Q15	3.58	0.79
Perceived ease of use (PEOU)	Q2	3.47	0.80
	Q6	3.34	0.88
	Q9	3.24	0.77
	Q11	3.53	0.84
	Q17	3.47	0.80
Attitude toward usage (ATU)	Q3	3.60	0.85
	Q7	3.67	0.83
	Q12	3.60	0.83
	Q16	3.59	0.85
Behavioral intention to use (BIU)	Q1	3.20	0.78
	Q5	3.25	0.88
	Q13	3.53	0.90
	Q14	3.52	0.85

Table 3 Demographic characteristics

Item	Responses			
Have you used web-based interactive tool before taking this class?	Never	Once	2–3 times	More than 3 times
	51 %	36 %	11 %	2 %
What is your self-assessment about using web-based interactive tools?	Low experience	Moderate experience	High experience	
	48 %	43 %	9 %	
After working with the web-based interactive tools in this class, how experienced would you judge yourself to be?	Low experience	Moderate experience	High experience	
	24 %	68 %	8 %	
With regard to technology in general, how would you describe yourself?	Novice user	Intermediate user	Advanced user	
	17	69	14	
Gender	Male		Female	
	21		79	
What is your bachelor program?	Bachelor of Management (Marketing)		Bachelor of Management (Tourism)	
	44		56	

mechanism involved in the relationship between antecedents of attitudes toward usage (ATU), i.e., perceived usefulness (PU) and perceived ease of use (PEOU) and behavioral intention to use (BIU). This description of mediation is consistent with the guidelines of mediator effect as suggested by Baron and Kenny (1986).

In TAM, PU and PEOU are considered cognitive factors, whereas ATU has been identified as a factor that guides future behavior or the cause of intention that ultimately leads to a particular behavior, in this instance, BIU. In order to substantiate the theory, a post hoc analysis was performed to understand the relationship between PU, PEOU, ATU, and the dependent measure, BIU. A test for mediation using hierarchical multiple regression analysis was performed as recommended by Baron and Kenny (1986) to test the mediating role of ATU in the relationship between its antecedents and BIU.

Baron and Kenny (1986) have set three prerequisite equations prior to establishing the mediational model: firstly, the independent variables must have significant associations with the dependent variable in the first equation; secondly, the independent variables must have significant associations with the mediator in the second equation; and, finally, the mediator must affect the dependent variable in the third equation. Perfect mediation is established if the independent variables have no significant associations when the mediator is controlled (in the third equation). If the independent variables still have significant associations to a reduced level in the third equation, a partial mediation is formed.

Table 4 presents the three sets of regression analyses performed to establish the role of ATU as a mediator in the relationship between its antecedents (i.e., PU and PEOU) and BIU (dependent variable) as recommended by Baron and Kenny (1986).

Table 4 Regression testing the mediating effect of ATU on the relationship between PU and PEOU and BIU

	Model 1		Model 2		Model 3	
	Dependent variable					
	BIU		ATU		BIU	
Independent/mediating variables	Beta	*t*-value	Beta	*t*-value	Beta	*t*-value
PU	0.569**	7.798	0.339**	4.916	0.485**	6.385
PEOU	0.272**	3.372	0.531**	7.702	0.141	1.713
ATU					0.246**	3.122
Constant		0.942		1.923		0.942
Multiple R	0.799		0.822		0.811	
R^2	0.638		0.676		0.651	
F test statistic/significance	$F(2,171) = 150.556$		$F(2,171) = 178.620$		$F(3,170) = 108.756$	
	$p = 0.00$		$p = 0.00$		$p = 0.00$	

**Significant at the $p < 0.001$

Prior to the analysis, preliminary tests were carried out to confirm that the assumption of multicollinearity is not violated.

In model 1, the regression analysis found significant associations between PU, PEOU, and BIU ($R^2 = 0.638$, $F_{(2, 171)} = 150.556$, $p = 0.00$). Both perceived usefulness and perceived ease of use were significant (PU, beta = 0.569; PEOU, beta = 0.272). Another regression analysis was performed to examine the association between the independent variables and the mediator (model 2). In this model, the independent variables also indicated a significant effect on the mediator ($R^2 = 0.676$, $F_{(2, 171)} = 178.620$, $p = 0.00$). A final regression analysis was performed by regressing all independent variables and the mediator on the dependent variable (model 3). In this model, the mediator (ATU) was significant (beta = 0.246, $p = 0.00$). Due to the reduced effect of the independent variables in model 3, these results establish a perfect mediation of ATU in the relationship between PEOU and BIU (see Fig. 2). However, PU still had an effect on BIU when the mediator was controlled, thus supporting a partial mediating role of A_{Print} in the relationship between the two variables.

From the above hierarchical multiple regression, Table 5 shows the result of the hypotheses tests.

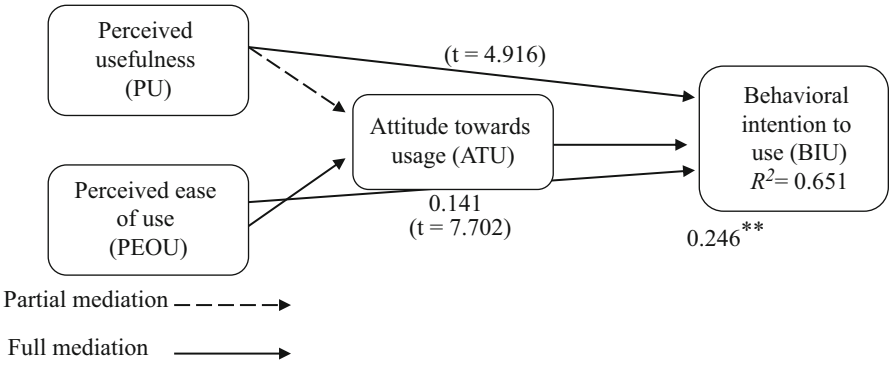

Fig. 2 Relationship between PU, PEOU, ATU, and BIU

Table 5 Hypotheses testing results

Hypothesis	Path	Results
H_1	PU → BIU	Supported
H_2	PEOU → BIU	Supported
H_3	ATU → BIU	Supported
H_4	PEOU, PU → ATU → BIU	Supported
		Note: partial mediation for PU → ATU → BIU

6 Discussions and Conclusion

The findings suggest that TAM can be applied legitimately in the context of determining students' behavioral intention to use Web 2.0 interactive EduTools. All hypotheses were supported. A closer look at the constructs proved a full mediating role of attitude toward usage (ATU) between perceived ease of use (PEOU) and behavioral intention to use (BIU). Perceived usefulness (PU), however, was partially mediated by ATU. An easy explanation might be that when students perceive Web 2.0 EduTools are easy to use, they may have a favorable attitude toward the usage of the tools. This study gives an indication of students' acceptance and adoption of a new interactive approach in the classroom in Malaysia's higher education context. However, it is advisable to academic faculty to identify and master the features, tools, and techniques available such as interactive presentation applications, mind-mapping software, online quiz makers, and online community. This new approach will not only enhance students' learning experience but, most importantly, improve the quality of academic teaching.

Although PEOU had a significant effect on ATU, which led to a significant effect on BIU, PU remained the main construct that influences students' behavioral intention to use web-based interactive tools. The significant PEOU→ ATU →BIU relationship is consistent with prior research (Shroff et al. 2011; Davis 1989; Hu et al. 1999), which explains why students may have the intention to use the system when they perceive it is easy to use. Knowing that students already perceived the usefulness of the system and the fact that the perception leads to favorable intention to use it, it becomes apparent and easier for academic faculty to encourage and promote more interactive lectures via web-based learning tools. The challenge now is to educate them on how easy it is to utilize the tools and the technology. When selecting a Web 2.0 EduTools for adoption, it is necessary for the administrator and faculty members to master the benefits and features so that shared knowledge can easily be imparted to the students. Increased understanding facilitates favorable ease of use perception, which in turn motivates the intention to use. The authors opine that the usage of Web 2.0 EduTools in the classroom is a subset of the adoption of Internet-based e-learning technologies as a whole, which recognizes the importance of interactivity and creativity in students' learning environment, shifting away from the traditional and conventional one-way classroom-mandated design of a lecture. Emerging educational technology such as Web 2.0 EduTools is the way forward and often used to provide more flexible interaction between academic faculty and students.

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"Initially, It Was Meticulous, But Now I Prefer Online": A Case Study on the Implementation of e-Examination in Taylor's University

Rohaizan Baharuddin and Zaim Azizi Abu Bakar

Abstract As technology continues to become widely used in teaching and learning, it has led to new developments in course assessment. The present education system witnesses that online examination is not a new phenomenon especially in developed countries. However, we know little about the implementation of online examination in developing countries, especially in the Malaysian context. Hence, using Blackboard 7 as the main instrument, this paper shares the implementation of online examination of three face-to-face compulsory modules – Malaysian Studies, Islamic Studies, and Moral Education – conducted at Taylor's University from February to June 2012. It discusses the issues encountered and problems faced during the implementation process and presents feedback from direct stakeholders such as lecturers and students. The findings demonstrate that technical issues are the main problem faced during the implementation of e-Examination. Despite few adversarial remarks, most lecturers and students responded positively toward the implementation of e-Examination and hope for more module assessments to be conducted online. Finally, recommendations for improvement of future implementation of e-Examination are also presented.

Keywords Online assessment • e-Learning • Computer-based test • e-Examination

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1 Introduction

Over the past few decades, online teaching and learning has become increasingly popular and significantly demanded especially by the Gen-Y students. This trend motivates academics to venture into technology in teaching and learning process. Mastering technology has become vital to the extent that many scholars believe it is no more a privilege, rather a required skill for teachers. Dunn (2013), for example, lists ten skills modern teachers must have and seven of them are related to technologies. Among all are understanding the roles and uses of technology in education, knowing how to find useful educational technology resources, managing online reputation, knowing how to blog correctly, making use of social media, knowing when to disconnect, and avoiding fear when working with technology.

It is undeniable that technology plays an important role in the teaching and learning process. It offers the possibility of changing our teaching and learning methods (Littlejohn and Pegler 2007; Lokesh 2013), ranging from when and where to learn until what kind of resources and tools to adopt to make learning process more enjoyable, engaging, and effective. It fosters integration of different spaces (Littlejohn and Pegler 2007), allowing students to learn from campus, from home, or even on the move. It also opens up opportunities for collaborative learning (Lokesh 2013), thus, enriching students' learning experiences (Morrison 1999). Consequently, this phenomenon triggers up opportunities for new educational development and innovations, thus adding varieties to learning tools. One of the new tools which are increasingly adopted to facilitate online teaching and learning is online assessment or online examination.

Online assessment can be defined as a method of using information technology for any assessment-related activities (Graff 2004). It has recently emerged as a popular mean of assessing student knowledge. According to a study of 400 vocational learners conducted by Bicanich et al. (1997), 75 % learners preferred online examination to paper-based assessments, mainly due to its flexibility on time and place to sit for the exam. For the academics and institution, online examination is preferred because it is cost-effective (Howarth et al. 2004); not only it is paperless, it also provides a speedy marking and release of result and solves the problem of shortage of manpower. Conventional paper-based assessment is now seen as old-fashioned and outdated compared to online assessment (Parshall et al. 2002).

While the advantages of online examination are indisputably acknowledged by many academics, only few of them were willing to go out of their comfort zone and ventured into online examination. Among those few, only a small ratio shared their experience in terms of academic writing (see Bull and Mckenna 2004; Brink and Lautenbach 2011; Comeauz 2005; Howarth et al. 2004; Liang and Creasy 2004). The majority of these scholarly works discuss on guidelines in conducting online assessment or share specific online assessment initiatives taken by individual lecturers involving small number of students. Hence, this study aims to fill up this gap by sharing a case study on the practices of mass online examination at the departmental level.

2 Background

In 2011, Taylor's University endorsed its *e-Learning Strategic Plan 2011–2015* with the target to offer at least 30 % of blended learning in half of its total modules offered. In Taylor's University context, blended learning is defined as adopting strategic and systematic implementation of technology in teaching and learning, combined with the best features of face-to-face (F2F) interaction with different modes of delivery as well as various ways of teaching and learning styles (Yao 2013). This definition includes but not limits to the use of lecture capture, online discussion/forum (both via social networking sites and learning management system (LMS)), interactive contents (e.g., games, simulations, animations), online collaborative tools, multimedia videos, podcasts and vodcasts, e-portfolio, online consultation/supervision, educational apps, and, last but not least, online examination and assessment.

By the year 2015, Taylor's University aims at providing every student the opportunity to learn in a collaborative, self-directed, and personalized manner anytime and anywhere and enabling them to learn collaboratively, taking charge on their learning based on their own needs, aptitude, and interests, in a synchronous or asynchronous manner. To achieve this e-Learning mission, blended learning is adopted as a tool. It is designed as an essential part of teaching to complement current teaching and learning methods and eventually linked with learning outcomes, module delivery, and assessment targets.

This paper aims at sharing the implementation of online examination at Taylor's University. This concept paper focuses on the insiders' experience in implementing online assessment in three face-to-face (f2f) compulsory modules which are Malaysian Studies, Islamic Studies, and Moral Education, conducted from February to June 2012. Its discussion covers mainly the three vital phases in conducting online examination: preexamination planning, issues encountered and problems faced during the examination, and feedback and recommendations from direct stakeholders such as lecturers and students.

3 Preexamination: Planning, Format and Design of the Online Examination

On 9 August 2011, a departmental meeting was held to discuss on the e-Learning initiatives for compulsory subjects. As a result, the meeting aimed to adopt five e-Learning targets by the end of 2012. The targets were as follows:

1. Minimum 5 % use of multimedia in teaching
2. Minimum 5 % use of video lecture/lecture capture in teaching
3. Minimum 5 % implementation of online discussion in teaching
4. Minimum 50 % implementation of online midterm exam
5. 100 % class administration (e.g., absenteeism, barring, announcement, distribution of handouts/notes, etc.) to be done online

Table 1 Timeline of implementation of compulsory subjects' online midterm examination at Taylor's University

Stage/process	Timeline						
	2011	2012					
	Dec	Jan	Feb	Mar	Apr	May	June
Pilot Test on Online Mid-Term Examination							
Decision to conduct 100% online Mid-Term examination for Malaysian Studies, Islamic Studies & Moral Education							
Staff Training on Crafting Online Examination Using BB7							
Implementation of Online Mid-Term Examination							
Getting students' feedbacks							
Getting lecturers' feedbacks							
Data compilation and report writing							

However, the fourth target was amended to 100 % implementation of online midterm exam during the departmental meeting dated 15 February 2012. In addition, the meeting agreed to start the implementation of this project starting with the classes commencing on 30 January 2012 onward. Table 1 projects the timeline on the implementation of compulsory subjects' online midterm examination at Taylor's University.

The format was set up considering two areas of concern which were the nature of questions and the design of examination. On the nature of questions, the academic agreed to adopt multiple-choice (MCQ), matching, and true/false types of question only. The number of questions was also revised from 50 for paper-based examination to 30 for online based. This MCQ format was similar to the paper-based examination format adopted prior to the implementation of online examination. This paper agrees with Shank (2009a, b) that this nature of question is less authentic in evaluating learning, but it is practical and commonly used, especially in mass classes and shorter duration of semester. Indeed, time constraint was the primary reason in adopting objective questions, as the modules were offered for only a 10-week time and taught in mass classes comprising of 40–250 students per class. Besides, there are other advantages of having MCQ examinations; it is easy to administer, and the questions can be improved using item analysis. It does not evaluate writing ability but focuses on reading comprehension skills. Objective marking too can be observed through MCQ examination.

On the examination design, focus was attributed to controlling cases of academic dishonesty. People have the tendency to assume that students who are distant from lecturers in online examination cheat more frequently than face-to-face examination. Studies conducted by Burrus et al. (2007), Grijala et al. (2006), and Krsak (2007) prove the opposite. However, we understand that cheating may occur in both proctored and non-proctored examinations, and there is no magical way to prevent it, especially when MCQ examination is concerned. One academic shares his personal experience on the conduct of online examination as follows:

> They were the multiple choice questions. 100 question exams. I have them online for students. But I think… my class got all As. They did wonderful on these exams I have been using over and over. I knew they shouldn't have gotten all As. Now what I do is I make them to come to campus to take the exam here… Pathology is more memorizing.… I think what they'd do is sit with their books and answer the questions. (Beebe et al. 2010)

Hence, academics have to have the awareness that there is no such thing as closed book examination as far as online examination is concerned (Hoffman and Lowe 2011); they must assume that students would refer to books/the Internet or at least consult a third person for answers. However, that does not mean we should compromise ethical issues in the name of technology. Hence, to reduce such opportunity, focus must be given at setting of the examination paper to reduce chances of cheating as low as possible.

In this case, the academics agreed to adopt several measures to effectively reduce chances for academic dishonesty. First, only one question appeared at one time (known as "once at a time" mode in BB7), instead of all questions appeared in one page (known as "all at once" mode in BB7). Second, all questions and answers were randomized and appeared in different orders for different students. Third, according to Sewell et al. (2010), to answer within 1 min per MCQ item is sufficient if students have prepared for the exam. However, in our case, the answering time will be limited to 40 s per question only, which was 20 min for 30 questions instead of 1 h for 50 questions practiced during paper-based examination. Fourth, each student was allowed to attempt the examination only once within the stipulated period; once they attempted, they must finish and submit it within 20 min, unless any technical issues arise. Fifth, backtracking of question was made disabled during the examination. Students were not able to return back to the past questions they have answered/unanswered. Sixth, examination was made available online for a fixed date and time only; access to the examination before and/or after the fixed date and time was made disabled. Lastly, to familiarize students and lecturers on the conduct of online examination which can be technically vulnerable and unpredictable, lecturers were asked to prepare the trial version of online examination and made it compulsory for students to attempt it. This was to minimize faulty cases during the actual examination and avoid unsatisfactory results skewed by students' technical skills (Osika 2009).

All told, these steps help us minimize the opportunity to cheating and ensure smoothness in the implementation of online examination. While we certainly have not eradicated all problems, we believe that totally eliminating it is not likely on any exam, either face-to-face or online. Instead, these steps have allowed us to lessen the likelihood of cheating and examination mismanagement.

4 During Examination

As it is an online examination, technical problem is expected; system might down, Internet connection can be weak/disconnected, computer can get hang, etc. Prior to the examination, students were reminded to immediately report to the lecturer if

they face technical problems while answering the examination so lecturers can rectify the problem and allow the student to reattempt the examination. Under normal circumstances, lecturers will be on standby in front of the computer throughout the examination period, to monitor the progress of the examination and provide prompt reply to students.

The examination is set to be answered within a specific time, and BB7 accommodates this arrangement by recording the students' in and out time and the duration they took to answer the examination. By default, the exclamation mark sign (!) will appear in the result list if the students exceeded the time given. Penalty can be imposed to the students depending on lecturers' own discretion. In addition, BB7 records the students who did not attempt the examination. As the online examination can be taken anywhere anytime, academics have decided not to allow absentees to re-sit the examination except with valid reasons.

5 Problems/Issues Encountered

The 100 % online midterm examination of three compulsory modules at Taylor's University kicked off its initial stages on April and May 2012 involving eight lecturers and more than 1,000 students. Throughout the implementation period, several technical limitation and challenges surfaced, both faced by the lecturers and students.

Technical problems relating to Internet connection were the main challenges faced by the students and lecturers. Problems such as accessing the Internet via unstable and weak free Wi-Fi connection and system malfunction in the midst of examination were common issues faced by the main stakeholders. Even if the online examination was taken in the university's computer lab, the abovementioned problems did occur due to the limited bandwidth shared among students and a large number of students attempting the examination at the same time. Besides, as the exam lasted up to maximum 48 h, close monitoring the smooth run of the online examination proved challenging; lecturers faced difficulties to immediately attend to the problem encountered by the students especially at night and over the weekend. In addition to this, some students were not able to access the student's portal due to various reasons such as outstanding tuition fees, phantom students, and absenteeism, thus unable them to sit for the examination and get access to all notes.

6 Feedbacks from Stakeholders

After the online examination has ended, two sets of structured online interview – each for lecturers and students – were prepared and distributed. The interviews are both seeking stakeholders' feedbacks on their experience and opinion on online

examination as well as recommendation for improvement. Their feedbacks are categorized by type of stakeholders – the lecturers and the students.

Upon announcing the decision to conduct a 100 % online midterm examination to replace the paper-based examination, the lecturers responded with mixed feedbacks; some excited, others hesitated, and even few resisted on the idea as adopting a new way of doing things involved meticulous works and some of them were not equipped with the necessary skills such as creating the question bank, setting up the examination, etc. Being comfortable with paper-based examination, few lecturers still continue with the conventional method even after the decision was made. Their reason was BB7 would be used only temporarily as the university would shift to Moodle in less than 6 months' time. Though clarification has been made that BB7 and Moodle operationally work more or less the same when it comes to test and quizzes, they were not convinced.

However, after the hands-on training and few trials and errors, lecturers became familiar with the system and preferred to have online midterm examination to replace paper-based examination. This preference was driven by several factors.

First, it is ever efficient and time, energy, and resource saving. Lectures did not have to deal with most examination normal procedures such as invigilation, booking of exam venue, photocopying question papers, and others. With more than 1,000 students taking midterm examination in each semester, paper-based examination requires more lecturers to become invigilators. Finding and booking for the exam venue especially in a hectic campus like Taylor's University proves difficult and challenging. In addition to that, two printing and photocopying machines to be shared by all academics in each academic suite made bulk photocopying of question papers unfavorable and time-consuming to all. Furthermore, adopting online examination saves energy and resources. On average, each lecturer has a minimum total of 100 students in one semester. The paper-based midterm examination normally comprises of six pages. The total papers we can save if we convert them online are about 36,000 papers. This figure covers only for modules offered under compulsory subjects in one semester. How about in 1 year? How about if all schools at Taylor's University change to online midterm examination instead of paper based?

In addition to that, formatting a multiple-choice question paper which includes, among all, adjusting space, alignment, and margin is tiring, time-consuming, and tedious. The lecturers reported they spent more time formatting the exam paper than setting the questions. In online examination, there is no standard format to follow; the lecturers only have to choose the type of question and fill in the space provided. Once they have created the question bank, it will be much easier to set up an online examination with import function, and the question paper would be ready as quick as 10 min!

Not only setting up the question paper becomes easier, marking and recording the marks too get much faster and, most importantly, free from error. When setting up the questions, lecturers have to identify the correct answer as well as the weightage of mark for that question. After students attempted the examination and submitted their answers, the system will instantly mark the papers and give immediate result to the students without lecturers having to mark the question paper one by one.

Though online examination comes with many advantages, it has some setbacks too. The system can be very unpredictable and vulnerable at times; on the exam day, some lecturers said that the system was or under maintenance without prior notice from the relevant parties. Besides, two lecturers highlighted that the whole students who initially can access BB7 were unable to do so on the day of online examination.[1] Additionally, few lecturers reported that they were unable to view the answers submitted and marks earned by students.

From the student point of view as the end user and direct stakeholder, majority of them welcomed the idea and were eager to experiment, despite the lack of experience in answering examination online. The positive response of students was driven by the following factors. Firstly, online examination provides a cozy and relaxed examination setting for the students. Rather than sitting in a quiet, cold, stiff, and stressed examination hall, students preferred to have it at their place of choice – either at their own personal room, class room, library, university compound, home, restaurant, park, or mall, with their cup of coffee and instrumental music background, at their own preferred timing.

Secondly, depending on the types of question and number of students, marking period for paper-based examination normally takes about 1 week up to 1 month. In some cases, students would only know their marks for each assessment component just few days before the final exam. This lengthy marking period and delayed assessment result "steal" away students' opportunity for future improvement. Alternatively, in online examination, students were amazed on how "cool" the examination was when they instantly received their result after clicking the submit button.

Thirdly, as online examination is a non-proctored examination, it opens up more possibilities for academic dishonesty compared to proctored examination, as lecturers were not able to trace where, how, and with whom the students took the examination, and some students took advantage of this point to cheat in the exam. When the lecturers informally asked the students on cheating activities during the online examination, some students honestly admitted that they cheated in the exam, either by consulting prohibited materials or asking a third party, or both. Below were some of the responses given by the students pertaining to this matter:

"It increases our teamwork."

"I'm ready with Google and a stack of materials but unable to use them due to the limited answering time."

"I did not cheat, but I know many of my friends did."

Conversely, few students commented that sitting for online examination was annoying and troublesome especially when technical problem arose and access to reattempt the examination was blocked. Some other students mentioned about the limited and inadequate answering time and proposed for additional time.

[1] After investigation, we found out that the schools were in the process of assigning a new program code to the students and they needed to shift the entire students to that new code, and this arrangement was not made informed both to the lecturers and affected students.

7 Recommendations

The feedbacks from the lecturers and the students, especially the negative ones, have opened up for new suggestions and recommendations for improvement in the next round of online examination. The suggestions can be categorized into three: for lecturers, for students, and for relevant administrative offices.

The primary suggestion is to urgently address related technical dysfunction issues. This can be done through the following means. Firstly, lecturers who teach mass classes are recommended to divide the whole class into different exam sessions to avoid heavy traffic on the system. Secondly, if the number of students is small, lecturers can take initiative of booking the computer lab and conduct the exam session in the lab. While this suggestion defeats the purpose of online examination that enables the students to sit for examination anytime anywhere, it would significantly reduce the case of academic dishonesty as lecturers would be able to proctor the examination if it is held at one place. Thirdly, lecturers are advised to conduct the online examination during office hours so they can immediately attend to any problems faced by the students while sitting for the examination.

On minimizing the case of academic dishonesty, lecturers are proposed to conduct an open-book examination instead of a closed one. However, the nature of question is to be changed from factual-based questions to application based. The latter type of questions encourages critical thinking and emphasizes higher levels of bloom taxonomy such as application, analysis, synthesis, or even evaluation, and it is more difficult to look up for answers in the textbook for questions on this nature (Osika 2009). Table 2 illustrates an example on how to change a factual-based question into an application-based question.

Table 2 Factual-based question versus application-based question

Factual-based question
In the context of ethnic relations, _____ refers to a process whereby the minority ethnic groups absorb and practice the culture and identity of the majority group to reduce ethnic boundaries
A. Assimilation
B. Amalgamation
C. Acculturation
D. Accommodation
Application-based question
A + B + C = A
The above formula explains the process of _____ in ethnic relations
A. Assimilation
B. Amalgamation
C. Acculturation
D. Accommodation

Moreover, to limit the chances of students getting answer from other students, lecturers can consider developing several item sets. These sets test similar question, but are asked differently or cover slightly different aspects of the question with different orders. Alternatively, lectures should also opt on weighing the midterm examination less and putting more weight on assignment and presentation assessment where cases of academic dishonesty can be easily traced compared to online midterm examination. According to Osika (2009) and Sewell et al. (2010), if the online assessment carries huge weightage, students' pressure to score is high and many would end up in less-than-honest activities. However, if we split one big assessment into smaller few, the pressure will be drastically reduced. Adopting several assessments also allows academics to get to know students' attitude, intelligence, and performance, making the identification of academic dishonesty easier.

On the student part, they should be reminded prior to the online examination to use only fixed Internet connection rather than free Wi-Fi to avoid congested bandwidth, system failure, and slow Internet coverage issues. Trial online examination should be made compulsory to students, and they should be advised to sit for the trial examination using the same computer and same Internet connection they intend to sit during the real examination.

From the administrative side, the Academic Services are required to advise lecturers if there are any changes of enrollment made in BB7 by week 4, allowing online midterm examination to run out smoothly during weeks 5–7 of academic semester. This includes the exact number of active students in the class list. The cooperation from the ICT Department is also vital especially in giving prior notice of minimum 1 week if they plan to do system maintenance. Thus, lectures would have ample time to communicate with the students if examination rescheduling is needed.

8 Conclusion

This paper talks about a case study of online examination at Taylor's University. It discusses on the preexamination planning such as examination format and design, presents the technical issues and academic dishonesty cases encountered during online examination, shares the feedbacks from main stakeholders such as lecturers and students, and provides recommendations for future improvements. While the feedbacks received from various stakeholders were mixed in nature, positive feedbacks outweigh the negative ones. Indeed, most shortcomings happened were normal to encounter during the first implementation of any online project.

All in all, assessment can engage or deter, improve or worsen, develop or overburden, both students and lecturers. However, it cannot be escaped in any process of formal learning. Similar to paper-based examination, on-screen examination comes with many plusses and minuses. To optimize its plus points and minimize the minus

points, a thorough pre-online examination planning such as test development, technical trials, and training of staff must be conducted carefully and effectively. However, once established, online examination contributes to a rich usable question bank and provides reliably tested items for the examination.

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Part III
Supporting and Development

Are Students Pursuing Higher Education Aware of Personal Development Planning and Its Importance? A Pilot Study at Taylor's University

Christian Kahl and Gerald Raj Sundram

Abstract The need for constant adaptability and change to meet and be ahead of current developments whether discipline specific or in terms of additional skills is important for the success of a student in university life and beyond. Personal Development Planning (PDP) is seen as an integral tool in placing the responsibility to analyze, track, and continuously develop academic skills as well as soft skills directly in the hands of the students at Taylor's University. Students have the chance to fully utilize the PDP resources available through workshops, a walk-in resource center, and even one to one consultations where they get support with exposure to available tools and guidance on PDP. The focus of this paper is on the questions of how much students are aware of the importance and significance of PDP and how much they want to know more about PDP, in turn becoming intentional and independent learners to ensure their success in university life and beyond.

Keywords PDP • Student awareness • Usage extent • Continuous development

1 Introduction

Student support throughout their study becomes a central part of higher education. Nearly every university or colleges offer student support. Taylor's University created a program, which is called Personal Development Planning (PDP), to support students learning and future planning (Aberystwyth University 2010). PDP programs are designed to teach reflective learning, self-awareness, and future career planning (Clegg and Bradley 2006). A common program is designing a portfolio/e-portfolio to collect all learning outcomes and get them ready to present in job interviews to future employers (Cardona et al. 2008).

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This exploratory study is looking into the students' awareness of PDP programs in Taylor's University. Since the program was newly implemented, just last year, the researcher wanted to understand how the PDP responses are from the students' side, are they taking these offered courses, and do they think these courses are needed. The research takes special interest in the point of awareness based on the students' study year and courses offered, as well as which courses are favorite courses and should be continued and which courses need more intensive introduction or should be taken off the list.

The research objectives of this research are:

- The awareness of PDP
- The influence of study intake
- The influence of school belonging
- The importance of PDP by today's student

The research questions of this research are:

1. Are student aware of PDP?
2. Does the study year have an influence on the use of PDP?
3. Does the school have an influence on the use of PDP?
4. Is PDP important in today's higher education picture?

2 Literature Review

In today's world of higher education, every institution implemented their own Personal Development Program (PDP) to support their students (Aberystwyth University 2010; Brooks and McKima 2011; Burkinshaw 2005; Centre for Educational Development 2009; Queen University Belfast 2012; Revell 2007; Smith et al. n.d.; Thow 2004; University of Bath 2003a, b, c; University of Salford 2007). However, what is PDP? Each institution has its own definition, but the message is always the same. PDP shall support students throughout their learning process as well as prepare them for their further life in a working environment (Aberystwyth University 2010). Programs in PDP could be learning styles, language professionalism, learning counseling, portfolio or e-portfolio, résumé writing, or job application support (Thow 2004). Each university is focusing on their own students' needs. Overall, it can be said that PDP is the way of learning in a Higher Education Institution.

Furthermore, PDP enhances reflective learning in higher education, where students can extend their knowledge of study progression (The Keynote Project 2002; Thow 2004). With specially designed courses, such as reflective listening, students gain skills which will help them to learn and reflect on their subjects. This means that PDP is designed as a tool to support students' learning on a daily basis (The Higher Education Academy 2009).

However, universities are not offering courses passé; courses are designed based on the need of the students. Universities are constantly reflecting on their offered

PDP courses and with students' feedback (Strivens 2007) updating their courses or implementing new courses. A good example is the program to design your own portfolio. In the last few years, technology became so advanced that industry and students did not need paper portfolio anymore and institutions started to update their portfolio course to e-portfolio, where students can show their achievements in an e-form.

With the portfolio, the second target of the PDP is discussed, the employability of students (Richmond College 2013). Students need to be prepared for their work life after studying. Besides the portfolio designing and supervising training, PDP also supports students on their skills of writing résumé or helps to prepare them for job interviews (Revell 2007). These training courses are starting to be aligned with the industry needs and students' learning.

Overall, the PDP is going through a circle of doing => review => reflecting => planning (Centre for Educational Development 2009). However, if the circle is completed, it does not mean the work is done. To support PDP and sustain high-quality courses, the circle of designing and offering PDP courses needs to be continuously running (Centre for Educational Development 2009).

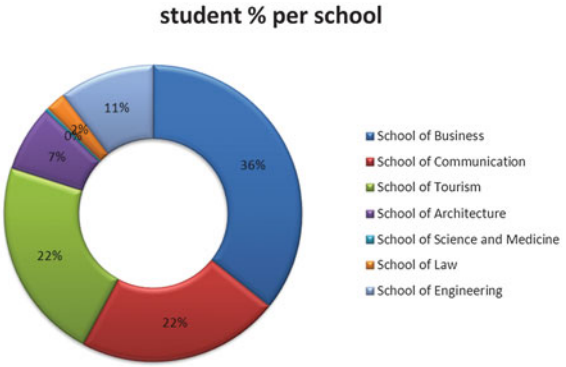
Which also shows feedback from students, who believed that PDP courses are useful to support their learning throughout their study time and supported them to prepare for life after Higher Education. Students also mentioned that PDP courses built their skills up from the lower level to higher needed level (Smith et al. n.d.; Thow 2004). Furthermore, students laid the weekly structure of their PDP training, so they can improve and professionalize their skill in a continuous way in combination with their study time and their study challenges.

Overall, the proposed outcome of PDPs is largely to support the learning process of students (Clegg and Bradley 2006), to make sure that all students have the same opportunity to walking through their study life. As well the reflection on career development to be prepared and have their documentation prepared (Revell 2007). Furthermore, the process of self-awareness has to mention an outcome of the PDP programs in higher education. Students have to learn and reflect about them to understand their strengths and needs for their study (Queen University Belfast 2012).

3 Methods

To understand how much students know about PDP, Learning Advising Center (LAS) decided to design a survey to get an overview of how much students are involved in personal development. The survey itself is structured in four parts, which covers personal information, semester, the knowledge of PDP, and the personal statement of their need of PDP. The main focus of this survey is to understand how deep PDP is involved in students' academic and how they implement their knowledge of PDP in their study. For the third part of the survey, students have been asked about their awareness of PDP and which PDP courses they took. Since PDP should be offered in a parallel structure to students in all different academic years, the third part will play a future role of how and where PDP has to be implemented.

Fig. 1 Student demographics



The survey was pretested in the department, where different people with various backgrounds tested the survey and gave feedback, what has to be changed and clarified. In this way, we verified the survey question and insure that all questions are understandable and not misinterpreted by students through the survey sessions.

The survey has a mix of multiple-choice question and open question. In general, multiple-choice question has been used to get a short and direct feedback from students to assess their knowledge. The open-ended question is looking more in the student's deep understanding of PDP and whether students use PDP in their daily academic life.

Overall, 1,534 students filled out the PDP survey. To insure a verified selection of students, the survey was handled out to students at all different schools. Additionally, students' cluster numbers also were chosen by the size of each school and by the study years. After collecting the surveys, the allocation was 35 % first semester, 22 % second semester, 22 % second year, and 21 % third year students. A special focus was given on the first year students, because PDP courses are mostly offered in their first year in university. Second and third year students are joining PDP programs for their study progress and for work life preparation (Fig. 1).

The student selection was done in a random choice of participants. Since all different schools are located at different places, surveys have been given out in front of these schools to insure that students of each school were involved in the questioning. Furthermore, several lecturers from different schools were asked to handle over the survey to their students to enlarge the participation of students on campus.

4 Findings

Since PDP is a newly implemented program, it is not a surprise that 91 % of the questioned students responded on the question of the knowledge of PDP negative. Another reason why students answered negative is that PDP is implemented in students' daily curriculum. Students see it as a normal course, which they have to take, and not as an extra offered course for improving their study skills. This shows students answer at the second question, where they had to name different PDP courses.

Students who know PDP and who do not know PDP named a wide collection of PDP courses, which are offered in the university. Furthermore, since the majority of the questioned students are in their first semester, students just started to take PDP courses and probably do not have the knowledge to answer the question: "Do you know what PDP is?" Only the School of Medicine rates against the university-wide trend. Forty percent of the medical students knew what PDP is. The reason might be that the School of Medicine was a newly founded school and that only few students joined the school at this time. Furthermore, shortly before the PDP survey, medical students had few PDP courses and could remember more clearly about PDP.

At the school of architecture, generally higher semester students know about PDP. This shows that only higher semester students are receiving PDP courses which are connected with their e-portfolio. Another picture shows the School of Engineering, where first year students (50 % of second semester students) replied that they knew PDP, which shows that study skill courses are recognized by engineering students.

A different picture shows the School of Hospitality, where PDP is known throughout all semester. Because of the intensive link of PDP and course syllabus, students are joining PDP courses during their entire study. Freshman students are joining study skill courses and courses which support their study progress. Students in the second year are deeply involved with the e-portfolio project which runs with PDP together. Final year students are joining career planning courses to be prepared for their work life after their studies (Figs. 2, 3, 4, and 5).

The open question, where students have to list PDP courses, showed an opposite picture of the first question. Students listed several courses, also if they answered

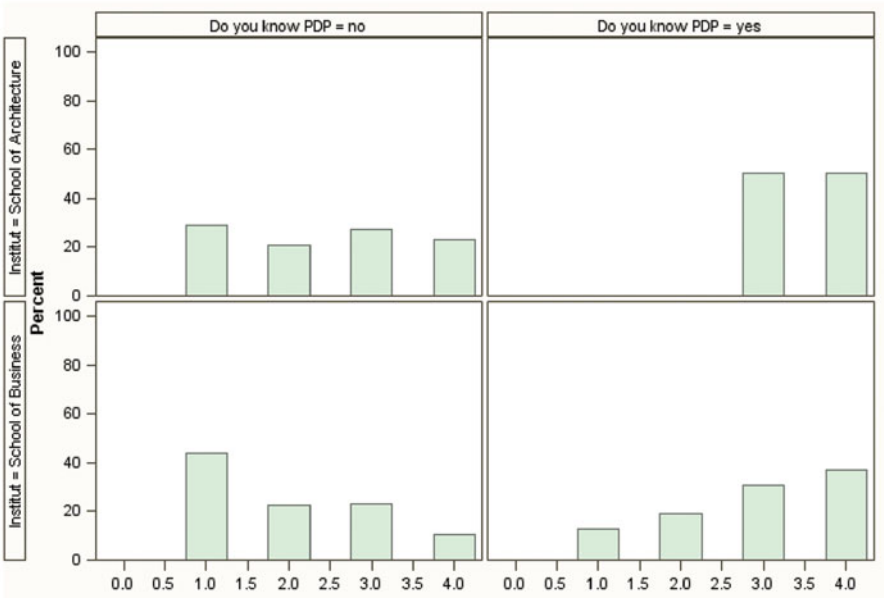


Fig. 2 Awareness of PDP

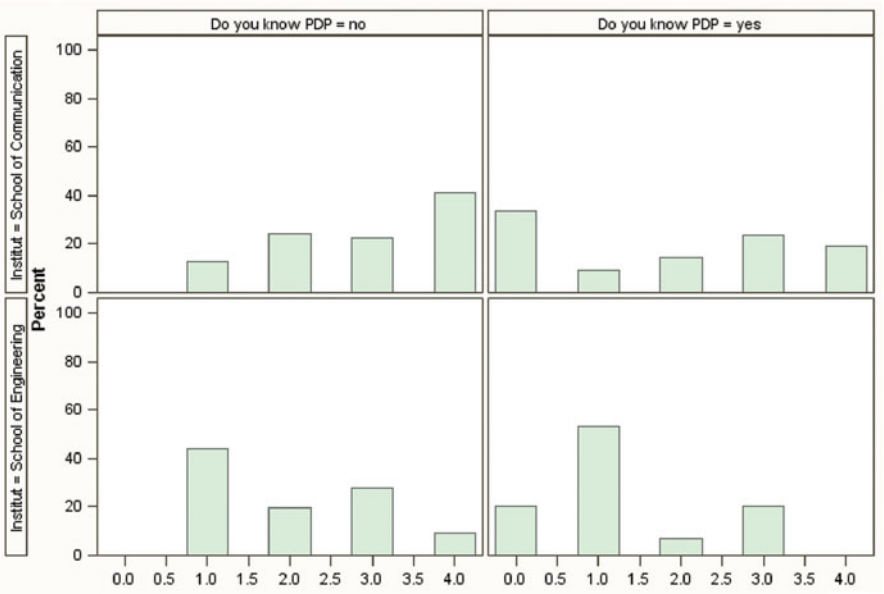


Fig. 3 Awareness of PDP

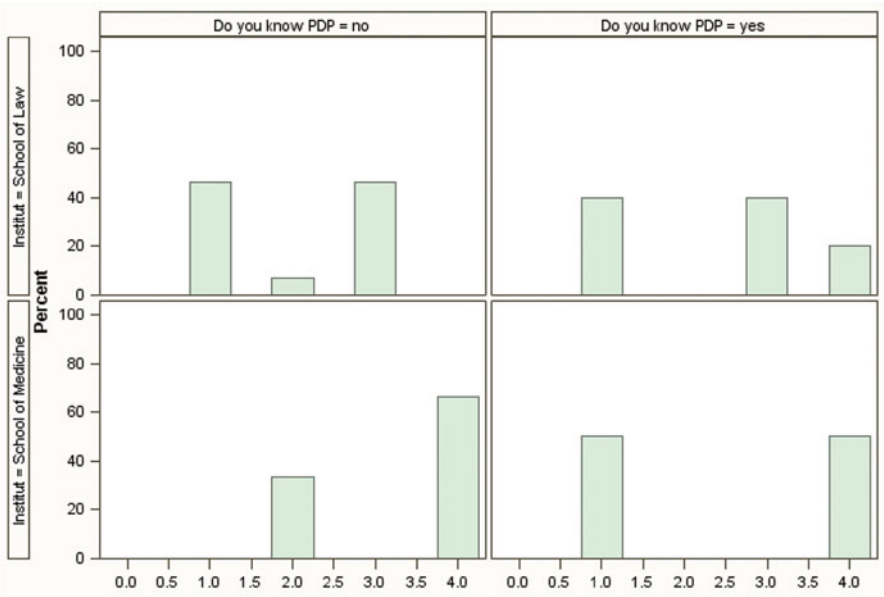


Fig. 4 Awareness of PDP

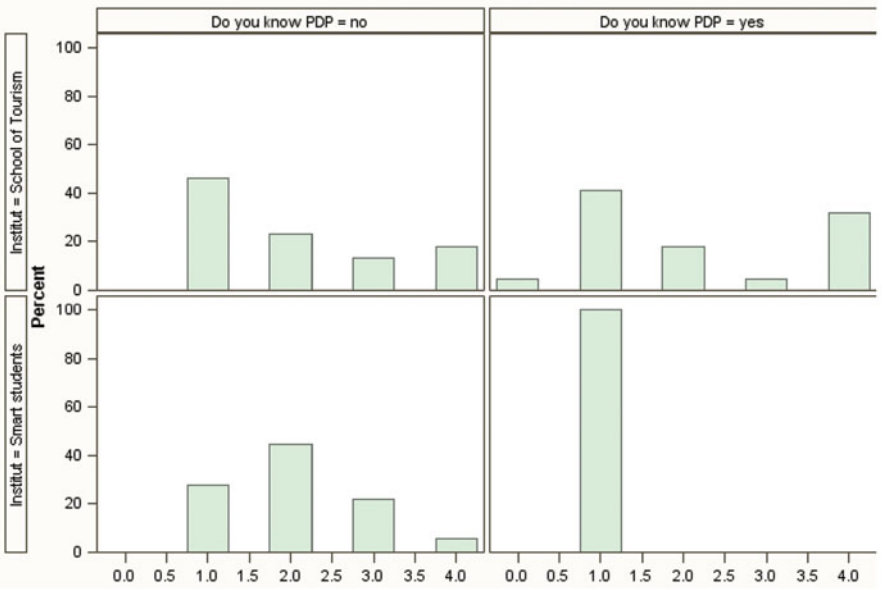


Fig. 5 Awareness of PDP

"No" at the first question. The most common answers were time management, stress management, project management, future career building, and study skills. This shows that students recognize PDP topics in their schools and can use them in their daily study life. Especially topics like study skills and time management are welcomed, and students appreciate these courses throughout their study time. Another trend is the awareness of career building. Students are starting their career planning at their study time. This can be a benefit for students, because they can gain more professional knowledge throughout their studies, which they can use at their work place later. Not so often but regularly mentioned are presentation skills, critical thinking, and plagiarism. PDP courses which have a deeper focus on study skills are not so commonly remembered by students. This can have two explanations: Firstly, the PDP program is a new integrated program and until now not fully integrated. And secondly, students do not see a use of deeper focuses on study skills and are satisfied with the current introduction programs which they see are more supportive for their study. Overall, it can be said that students named a variety of PDP courses at this open-ended question and it showed that students took the opportunity to enter into PDP courses and used the gained information for their study and their preparation for their working life.

Question number three, which was control questions of students who know what PDP is, was split into four different answers. Thirty-three percent of all questioned students answered that PDP is supporting their study abilities, their plan for developing knowledge for their study subjects, and their future planning after university.

If the categories are split, students are generally seeing PDP as a tool for their study abilities and skills. This shows that students understand the importance of PDP as a study tool and recognize and appreciate it as support courses. Especially the School of Law is seeing PDP as a tool for study abilities and skills. Twelve out of 19 are saying that PDP is a tool for their study support. Again it shows that schools, which are offering PDP intensive to their students, get an active feedback and students remember what they learned and use it throughout their study. Another trend is that 18 % of all questioned students are seeing PDP as a future planning tool. Students are looking for planning support for work after they study. Especially portfolio or e-portfolio is one of the wanted future planning tools which students request and prefer to join. Only 16 % of the questioned students answered that they are not sure about what PDP is and answered with "Not Sure."

Question number four asked students if they had joined PDP courses in their school, and the analysis shows that 79 % of all questioned students did not join a PDP course since they joined the university. Only 21 % already have PDP experience. One reason why only a quarter of all students took PDP courses is that PDP is a new initiative and is not implemented in all schools. Only in schools which have PDP courses did students answer positive at the question of joined PDP courses in their school. In addition, students from the second and third study year are not so strongly represented as the first year students. This implements that these students votes are % smaller compared to first year students.

The fifth question asked students about their opinion on the importance of PDP for today's university students. Not surprisingly, majority of students said that PDP is very important (32 %) and important (55 %). Only 2 % of the questioned students are seeing PDP as not useful for their study success and for their preparation after university. This shows again that today's students are interested in PDP courses at their study time in higher education and they are appreciating the university's offers on PDP courses.

5 Conclusion

Surprisingly, students at Taylor's University are not aware of the PDP program itself; therefore, student argued that PDP is not as important as expected. Reasons why this result is negative could be that the program itself was just implemented and the awareness of it was not established. For example, TCHT students are aware of the PDP, because it is part of their coursework. Another explanation of the negative result could be that PDP was planned to be part of standard courses in all schools and not separately offered courses. In this way, students are not aware of PDP itself, but practicing it.

The point of awareness changed based on the study year; first year students are mostly not aware of the offer of PDP. Where final year students already using PDP for their needs and are positively impressed on the programs offered (Clegg and Bradley 2006). As well final year students take the chance to extend their knowledge

of learning and study skills for their future preparation (Smith et al. n.d.). Student feedback is that PDP is useful and helpful to understand needs of the work live and help them to develop skills and documentations for their future career (Thow 2004). A good example is the portfolio-designing course, which most of the surveyed students mentioned as a PDP course.

As well student mentioned that study skills are PDP courses and should be continuously offered to all students.

A limitation of the research was that not all students could be part of the survey to get an understanding of the entire population. Furthermore, PDP was newly implemented, which means that students were confused about the program and could not answer the survey question to the best of their knowledge.

For further studies, a cohort study should be implemented to see the change of opinion of students throughout their study time in Taylor's University. As well in-depth surveys and focus group interviews should be done, to understand students' needs to develop and professionalize PDP for future generations.

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Quantitative Assessment of Students' Cognitive, Psychomotor, and Affective Learning Skills for Taylor's University Engineering Programs

Reynato Andal Gamboa, Satesh Namasivayam, and Ramesh Singh

Abstract Local and foreign universities offering engineering programs transform the engineering education from the traditional content-based and input-centered method into an outcome-based education (OBE) and output-centered method. This paradigm shift centers on what is essential for all students to know and be able to do successfully at the end of their learning experiences. Thus, assessment of students' general graduate attributes such as cognitive, psychomotor, and affective learning skills is of great importance to monitor and gauge the students' readiness to meet the higher skill requirement of the job market upon graduation. This paper presents a quantitative assessment of students' cognitive, psychomotor, and affective (CPA) learning skills for Taylor's University engineering programs. An end-of-semester assessment tool (ESAT) was developed and used to assess the students' CPA learning skills in the module level and the program level. All modules were used to assess the cohort's CPA learning skills based on the guidelines set by the Engineering Accreditation Council (EAC). The result of this assessment offers valuable information that can be used for continual quality improvement (CQI) action planning and further improvement of the program module delivery.

Keywords Quantitative assessment • Cognitive • Psychomotor • Affective

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1 Introduction

Employers are looking for the right workforce for smoother business operations, excellent service, and good workmanship (Lockhart 2013). They usually prefer graduates that are:

- Comfortable working with others in a team
- Able to lead and be led
- Capable of hands-on participation – outside of their typical duties – when necessary
- Willing to pursue ongoing training and education
- Sensitive to diversity in the workplace
- Aware of, and can articulate, personal goals

Hart et al. (1999) describe these skills as integration of both *know-how* and *knowledge-of* and extending to personal qualities needed for personal endeavors and new challenges in the workplace. The know-how involves knowledge and development of intellectual skills (Bloom 1956), while the knowledge-of involves the physical movement, coordination, and use of psychomotor skills (Simpson 1972), and personal qualities include the ways in which a person deals with emotions such as change of feelings, values, motivations, and attitudes, among others (Krathwohl et al. 1973). These are clear indicators of the graduates' expected capabilities upon graduation (IEA 2013). Recent surveys on employers' need for graduates showed high emphasis on personal qualities compared to technical competence which most graduates lack these abilities (Sternberg 2014; Farkas 2007; Martin et al. 2005). To address this need, universities offering engineering courses are now shifting from the traditional content-based and input-centered method into an outcome-based education (OBE) and output-centered method (Spady and Marshall 1991). In OBE, the focus is on what is most essential for students to know and be able to do upon graduation (Spady 1994). In line with this objective, EAC manual (2012) outlined the OBE process implementation as shown in Fig. 1. As indicated, the OBE process is a top-down approach. PEOs are developed with active participation of stakeholders, advisory committee, and alumni. Attainments of PEOs are best measured 3–5 years after graduation. POs are then developed to achieve the PEOs' key performance indicator (KPI). PO attainments are evaluated immediately upon graduation to determine whether graduates possessed the required skills to be job ready. To address all POs, LOs are developed in each module based on required skills stated in the POs. Assessments are then developed to measure the LOs of the module by the end of the semester. Mapping of LOs to assessments, POs to LOs, and PEOs to POs is established accordingly. The assessments, LOs, and POs are also mapped to cognitive, psychomotor, and affective (CPA) learning domains. The end product of these assessments is the students' level of LO and CPA attainments in the module level and the PO and CPA attainments in the program level. Literature showed that most CPA assessments were done in the module level by using surveys (Willey and Gardner 2007; Rovai et al. 2009; Baidowia et al. 2012; Frisby et al. 2014) and peer

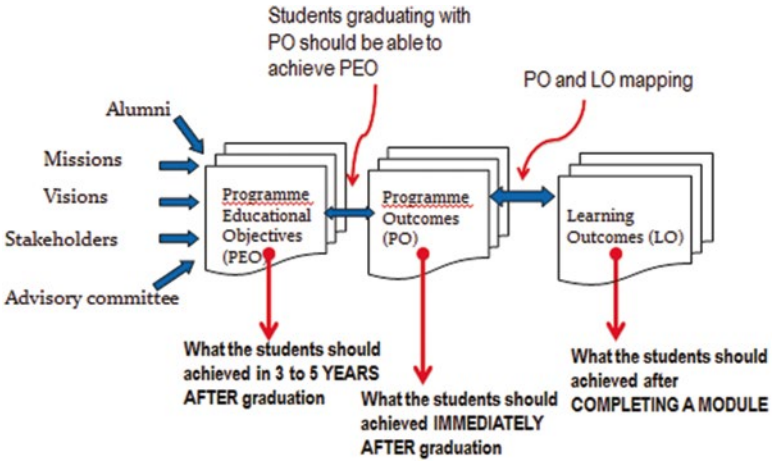

Fig. 1 OBE process flow based on EAC manual 2012

assessments (Willey and Gardner 2007). Taylor's University for its part used a quantitative method of assessing the students' CPA attainments both in the module level and program level using ESAT.

2 Assessment Methodology

The school of engineering of Taylor's University offers accredited programs in chemical, electrical and electronic, and mechanical engineering. The school crafted its own program educational objectives (PEOs) and program outcomes (PO) to do OBE assessments and CQI implementation anchored from university core purpose and mission and guided by the EAC 2012 manual (Gamboa and Namasivayam 2014). The university's OBE implementation model is shown in Fig. 2 (Namasivayam et al. 2013a, b). In the LO loop, the module coordinator prepares the scheme of work (SoW) based on approved PO-LO mapping of the module. The LOs and CPAs are directly mapped to weighted assessments based on SoW. Furthermore, the POs are mapped to LOs, and CPAs are subsequently mapped to both LOs and POs based on CPAs to assessment mapping. This process is carried out in the module level through ESAT (Gamboa and Namasivayam 2012, 2014; Namasivayam et al. 2013a, b). This assessment is performed by the module lecturer at the end of the semester where results are used to evaluate the module's LO, PO, and CPA attainments based on predefined key performance indicator (KPI) to identify the gains and gaps of CQI implementation and module delivery.

A CQI action plan is then prepared to address low LO attainment which subsequently addresses related POs and CPAs to close the loop in the module level. The

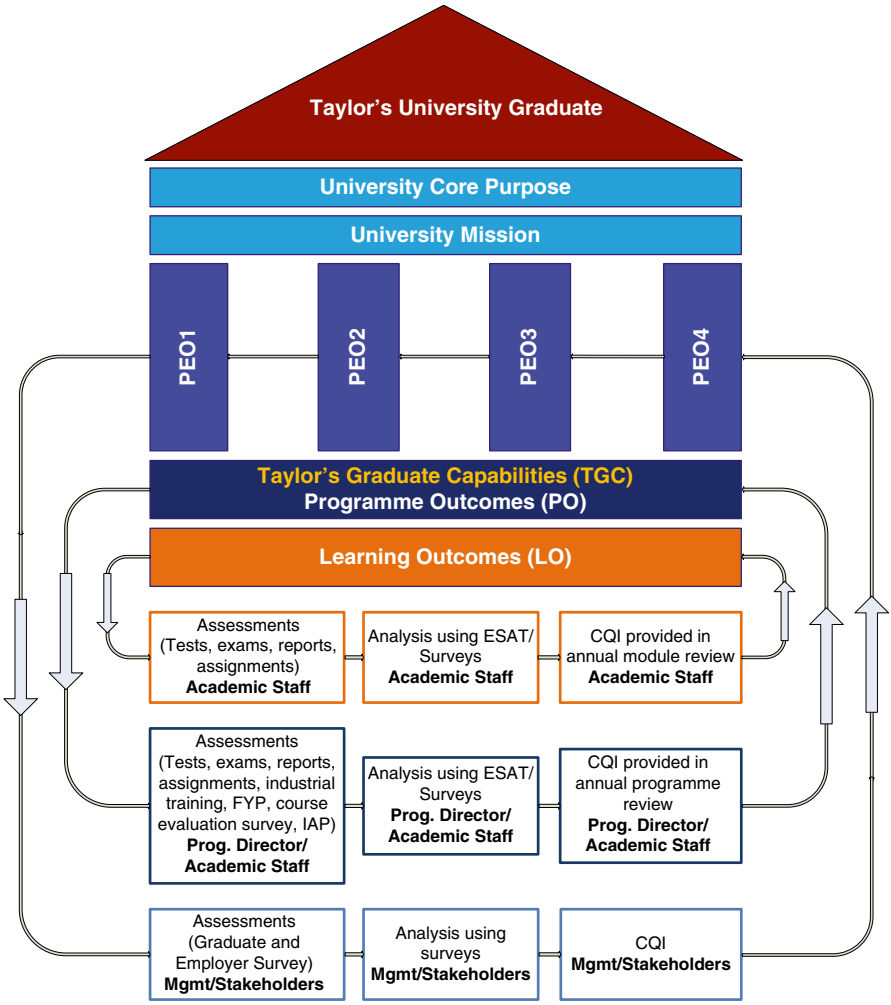

Fig. 2 Taylor's University OBE process flow model

whole CQI process in the module level is shown in Fig. 3 (Namsivayam et al. 2013a, b).

In the PO loop, all module ESAT results are stored in the database system to generate the program level PO and CPA attainments. The cohort's CPA attainments are based on the percent number of students achieving KPI. End-of-semester CPA attainment result can be generated by the program director to evaluate the semester and aggregate performance of students, thus identifying gains and gaps or insufficiency in running the program. CQI plan is then prepared to further improve the program, thus closing the loop on an annual basis and upon graduation of the cohort.

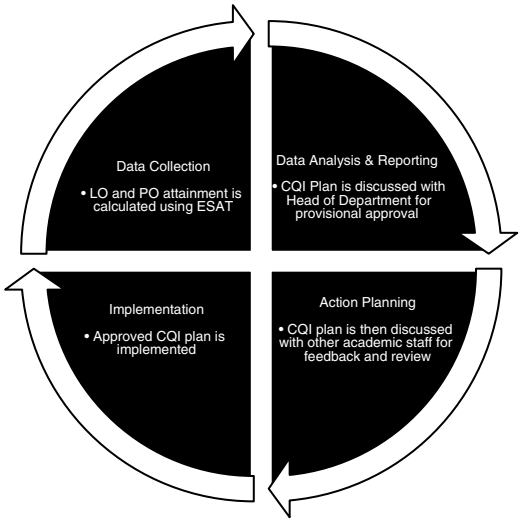

Fig. 3 CQI process flow model

Fig. 4 LO-assessments and CPA to assessment mapping

3 Cognitive, Psychomotor, and Affective (CPA) Skills Assessment

The quantitative assessment of CPA attainments begins at the module level using ESAT. Based on approved SoW, PO-LO mapping and the weighted assessment components of the module are loaded into ESAT. The module coordinator then maps the LOs and CPAs to assessment components based on weightage of the assessments. A screenshot is shown in Fig. 4.

Assessment components need not be based on 100 as they are automatically normalized to 100. In this process, ESAT automatically provides the mapping of CPAs to LOs as shown in Fig. 5.

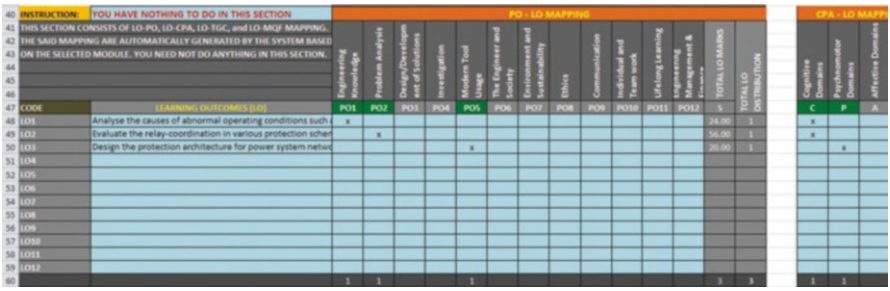

Fig. 5 PO-LO mapping and CPA-LO mapping

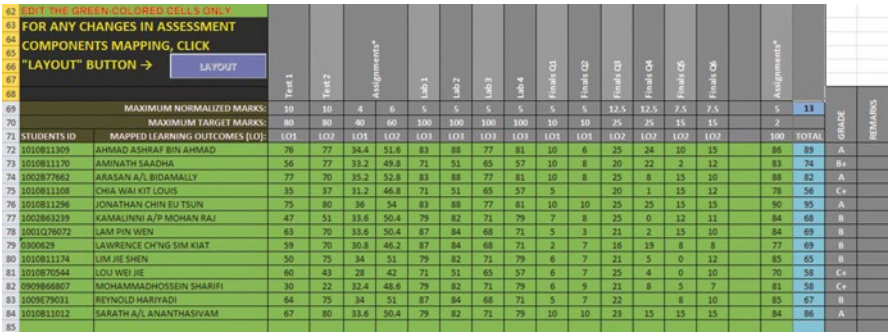

Fig. 6 PO-LO mapping and CPA-LO mapping

Individual student's marks are then entered into the worksheet for each assessment components, and ESAT automatically calculates the overall marks and the corresponding letter grade for each student. A screenshot is shown in Fig. 6.

Similarly, LO, PO, and CPA attainments are automatically calculated for each student. For example, LO1 is calculated according to Eq. 1:

$$\text{LO1 Mark} = \sum \frac{\text{Actual LO1 Mark}}{\text{Acual Maximum Mark}} \times \text{Maximum Normalized Mark}. \quad (1)$$

$$\text{CPA Mark} = \sum \text{LO shared marks}. \quad (2)$$

A screenshot of the resulting CPA attainments is shown in Fig. 7.

In Fig. 7, for each student, a learning domain (C, P, or A) is said to be attained if the student obtains at least 60 % (KPI) of maximum normalized mark. ESAT counts the number of students achieving KPI as indicated in the Figure. Figure 8 shows the bar chart comparing the CPA attainments of previous semester and current semester results.

	A	B	CW	CX	CY	CZ	DA	DB	DC	DD	DE
61								MARCH 2014 SEMESTER			
62	EDIT THE GREEN-COLORED CELLS ONLY.							13	C	P	A
63	FOR ANY CHANGES IN ASSESSMENT							Ave.	57.0	15.0	N/A
64	COMPONENTS MAPPING, CLICK			% # Students Attained ALL CPA				Target	60	60	60
65				Intake	Yes	No		No. Yes	10	13	N/A
66	"LAYOUT" BUTTON →	LAYOUT		MARCH 2014 S	76.9	23.1		% Yes	76.9	100.0	N/A
67								Attain?	Yes	Yes	N/A
68											
69		MAXIMUM NORMALIZED MARKS:		CPA Attainments				CPA Attained?			2
70		MAXIMUM TARGET MARKS:		80.00	20.00						ALL
71	STUDENTS ID	MAPPED LEARNING OUTCOMES (LO):		C	P	A		C	P	A	
72	1010B11309	AHMAD ASHRAF BIN AHMAD		72.7	16.5			Yes	Yes		Yes
73	1010B11170	AMINATH SAADHA		61.9	12.2			Yes	Yes		Yes
74	1002B77662	ARASAN A/L BIDAMALLY		65.2	16.5			Yes	Yes		Yes
75	1010B11108	CHIA WAI KIT LOUIS		43.3	12.2			No	Yes		No
76	1010B11296	JONATHAN CHIN EU TSUN		78.4	16.5			Yes	Yes		Yes
77	1002B63239	KAMALINNI A/P MOHAN RAJ		52.2	15.6			Yes	Yes		Yes
78	1001Q76072	LAM PIN WEN		53.0	15.5			Yes	Yes		Yes
79	0300629	LAWRENCE CH'NG SIM KIAT		53.8	15.5			Yes	Yes		Yes
80	1010B11174	LIM JIE SHEN		49.6	15.6			Yes	Yes		Yes
81	1010B70544	LOU WEI JIE		45.9	12.2			No	Yes		No
82	0909B66807	MOHAMMADHOSSEIN SHARIFI		42.6	15.6			No	Yes		No
83	1009E79031	REYNOLD HARIYADI		51.9	15.5			Yes	Yes		Yes
84	1010B11012	SARATH A/L ANANTHASIVAM		70.8	15.6			Yes	Yes		Yes
85											

Fig. 7 CPA attainment marks for each student

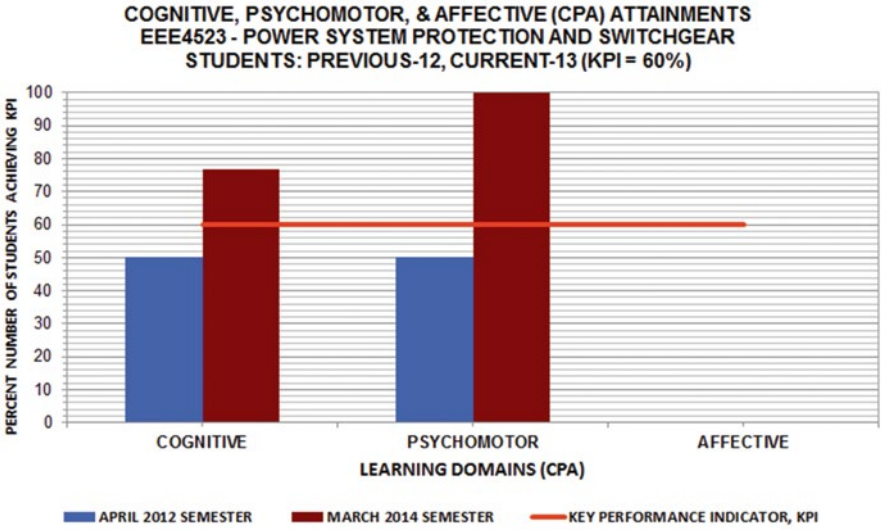

Fig. 8 Comparison of previous and current semester CPA attainment

It can be observed in Fig. 8 that current semester's cognitive and psychomotor skill attainments are higher than that of previous semester attainments. One reason for this is the effectiveness of CQI implementation made in the semester.

In the program level, all module ESAT results are collected and stored in the database system. The cohort's CPA attainment is calculated based on the percent number of students achieving KPI. Screenshots are shown in Figs. 9 and 10.

In Fig. 10, minimum engineering knowledge is said to be delivered by the program if 100 % of the students obtained at least 50 % of all their CPA skills. A second layer is added to serve as target KPI to indicate higher CPA achievements. For each

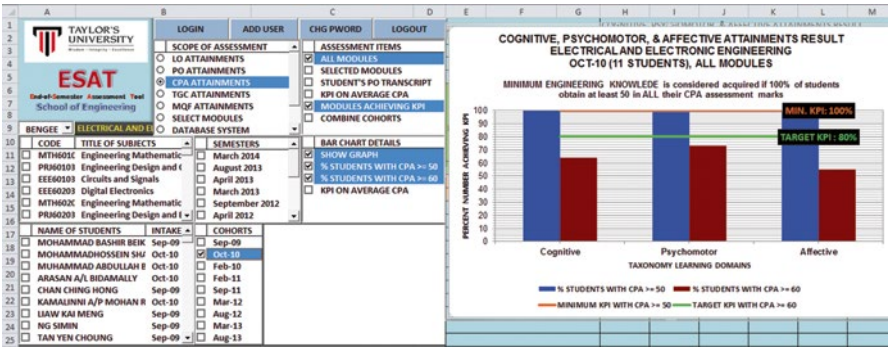

Fig. 9 Cohort's CPA attainment main window

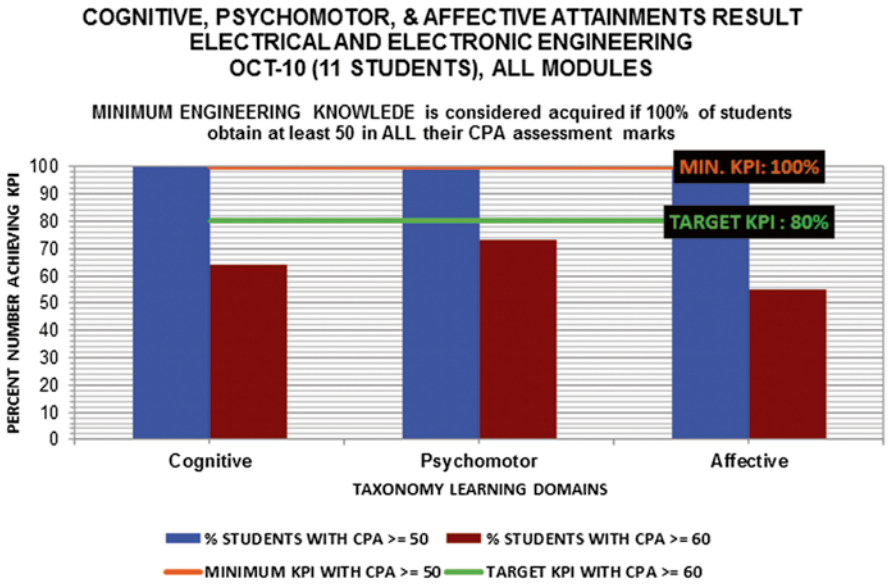

Fig. 10 Cohort's CPA attainments

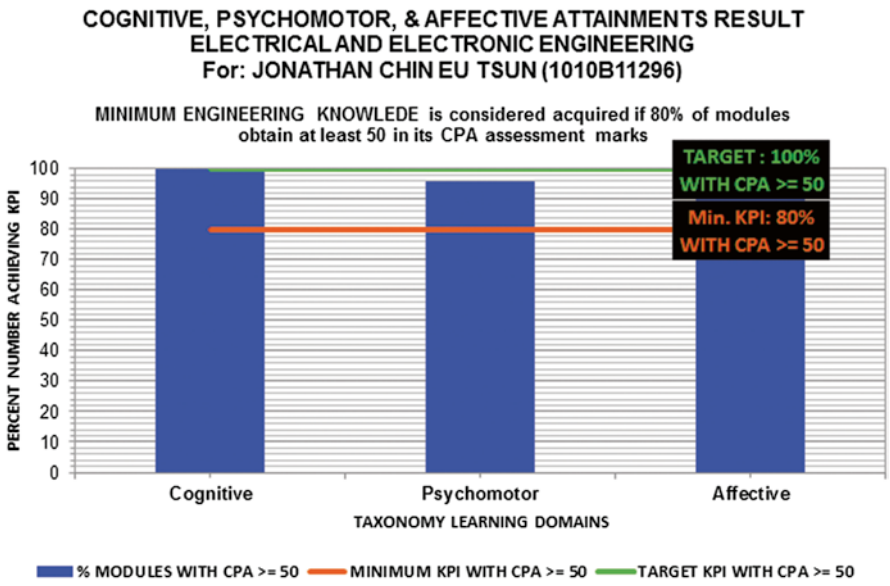

Fig. 11 Individual student's CPA attainments

student, CPA attainments are based on the number of modules achieving 80 % KPI. Screenshot of this attainment is shown in Fig. 11.

In Fig. 11, minimum engineering knowledge is considered acquired by the student if at least 80 % of the modules taken achieved 50 in cognitive, psychomotor, and affective learning domains.

3.1 Results and Discussions

The above presentation of CPA attainments used the Electrical and Electronic Engineering program of the university using all modules taken by the students from semester 1 to semester 8 and done by the individual lecturers at the end of the semester using ESAT. In the module level, Fig. 8 shows the comparative CPA attainments between the previous semester and current semester results based on 60 % KPI. Cognitive (C), psychomotor (P), and affective (A) learning skills are considered achieved if the assessment result is not less than KPI. The comparative results will determine the effect of CQI implementation in the current semester. As indicated in Fig. 8, gains were achieved and good practices should be recommended to be maintained. One limitation of this assessment is that attainments of the CPA skills were taken as a whole rather than based on their respective CPA levels. All modules follow similar process and CQI analysis. In the program level, students' individual attainments for each module were collected and stored in a database

which was used to generate the CPA attainments of the cohort as shown in Fig. 10. A minimum KPI of 100 % of students achieving 50 % CPA attainments was set from which the cohort's CPA should be able to achieve as reflective of acquiring the required minimum engineering knowledge in the program. CQI efforts applied in the program target the CPA attainments to reach at least 80 % of students who achieved 60 % CPA attainments. ESAT was also able to provide the individual student's CPA attainments based on all modules taken from semester 1 to semester 8 as show in Fig. 11. Again, the result covered only the aggregates of CPA skills rather than the respective cognitive, psychomotor, and affective skills level.

4 Conclusion

This paper presented the quantitative assessment of the students' CPA attainment result in the school of engineering. Results can be generated for each student and the cohorts at any given assessment period and until upon graduation. Critical evaluation of these results will reveal a lot of information on the strengths and weaknesses of the quality of teaching and student learning experience through the years. Gaps and insufficiencies such as breadth and depth of curriculum, concerns on module delivery and assessments, poor skill achievement of students, and staff capabilities among others are major contributory factors of students' inability to attain the target KPI for cognitive, psychomotor, and affective learning skills. With this in place, CQI action plan and its implementation can be done immediately to enhance the quality teaching and the student learning experiences in the program. The results however covered only the aggregates of the CPA skills rather than their respective skill level. More meaningful results could be derived if assessments can be broken down into the respective skill level, say, how many students achieve level 1 to level 6 of cognitive, psychomotor, and affective skills.

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Constructivist Learning Environments and Academic Achievement: A Study of Iranian TEFL Students

Mohsen Ghasemi Ariani

Abstract The present study scrutinized the probable interaction between effectiveness of designing constructivist learning environments and academic achievement of Iranian students. The further concern was to explore the degree to which constructivist learning environments affected the students' achievement. To this end, 40 students, doing Teaching English as a Foreign Language (TEFL) course at Islamic Azad University of Neyshabur, participated in this study and were assigned to experimental and control groups. To accomplish the purpose of the study, the participants were given a pretest and posttest, and few parts related to Developments in English for Specific Purposes course were chosen and designed based on Jonassen's model for designing constructivist learning environments. At this point, the experimental group attended the classroom and did those selected parts. And the control group studied those parts in traditional learning environment, too. To evaluate the effectiveness of the course, the students' achievement was analyzed and compared with control group. The quantitative data were subjected to a set of descriptive statistics. The findings reflected that constructive learning environments can influence on the process of learning. Also, training of the constructive group was found to be more effective than that of the systematic one.

Keywords Designing constructivist learning • Academic achievement • Learning environments

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1 Introduction

Objectivist conception of learning assumes that knowledge can be transferred from teachers and acquired by learners. Objectivist conception of instructional design includes the analysis, representation, and resequencing of content and tasks in order to make them more predictably and reliably transmissible (Jonassen 1995).

Constructivist conception of learning, on the other hand, assumes that knowledge is individually constructed and socially co-constructed by learners based on their interpretations of experiences in the world. The meaning that learners construct depends on their needs, beliefs, and prior knowledge. The model of designing constructivist learning environments (CLEs) tries to engage learners in meaning making or knowledge construction (Jonassen 1996). The following models for designing CLEs (Fig. 1 and Table 1) illustrate their essential components.

The model conceives of a problem, project, question, or issue as the focus of the environment with various interpretative and intellectual support systems surrounding it. The goal of the learner is to interpret, solve the problem, complete the project, answer the question, and resolve the issue. Related cases and information resources support understanding of the problem and suggest possible solutions; cognitive tools help learners interpret and manipulate aspects of the problems; conversation/collaboration tools enable communities of learners to negotiate and co-construct meaning for the problem; and social/contextual support systems help teachers to implement the CLE (Jonassen 1995).

2 Method

The present study is quantitative in that the data have been collected through descriptive analyses. In fact, the present study presents the description of the participants, measurement instruments, data collection procedure, and result.

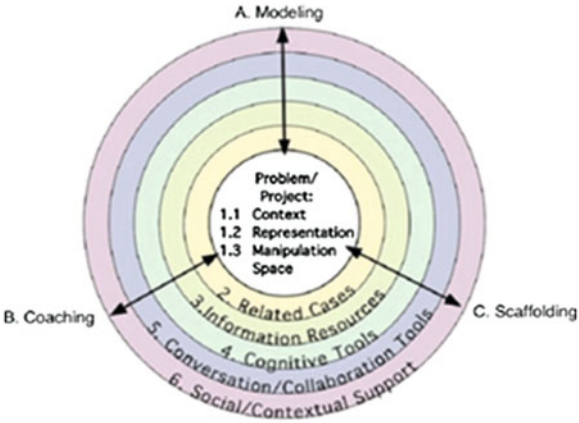

Fig. 1 Model for designing constructivist learning environments

Table 1 Components of CLE

Components	
Problem context	CLEs must describe the problem statement of all the contextual factors that surround a problem
Problem representation	The representation of the problem must be appealing and engaging. It must perturb the learner
Problem manipulation space	In order for students to engage in meaningful learning, they must manipulate something – construct a product, manipulate parameters, and make decisions – that affects the environment in some way
Related cases	In order to provide a rich set of related cases that will help learners to solve the current one, it is necessary to collect a set of cases that are representative of the current one (those with similar contexts, solutions, or results)
Information resources	In order to investigate problems, learners need information about the problem in order to construct their mental models and formulate hypotheses that drive the manipulation of the problem space
Cognitive tools	Cognitive tools are generalizable computer tools that are intended to engage and facilitate cognitive processing
Conversation and collaboration tools	Contemporary conceptions of technology-supported learning environments assume the use of a variety of computer-mediated communication to support collaboration and conversation among communities of learners
Social/contextual support	Accommodating contextual factors is important to successful implementation. It is also necessary to train the teachers and personnel who will be supporting the learning and finally train the students who will be learning from the environments

3 Participants

Forty students, doing TEFL course at Islamic Azad University of Neyshabur, participated in this study. The sample included 25 females and 15 males and the average age was 24. The sample also consisted of one experienced teacher who had PhD in TEFL.

4 Instruments

At this point, the participants were given a pretest and posttest, and few parts of the book (Developments in English for Specific Purposes written by Dudley-Evans and St John (2005)) related to Developments in English for Specific Purposes course were chosen and designed based on Jonassen's model for designing constructivist learning environments.

5 Procedures

To accomplish the purpose of the study, 40 students, studying Developments in English for Specific Purposes course, participated and were assigned to experimental and control groups. The control class in this experiment followed the traditional class in which it emphasized the role of teachers as knowledge dispensers and students as repositories. Besides, the procedure for the experimental class was rather different. This procedure was intended to design constructivist learning environment and to explore academic achievement. To this end, few parts of the course such as English for Specific Purposes (ESP), English for Academic Purposes (EAP), and English for Occupational Purposes (EOP) were chosen and designed (Fig. 2) based on Jonassen's model for designing constructivist learning environments. The participants were encouraged to use technology-supported learning tools such as tablet and phone pad to support collaboration among communities of the students. The students were divided into five groups and were asked to focus on one specific part individually and collaboratively. They were expected to classify their points of view, share, and verbalize their ideas in their groups. In fact, they were encouraged to put forward their opinions. More importantly, the most important role of the teacher was to monitor and regulate the students' performance. He provided hints and helps, such as directing learners to particular aspects of the tasks or reminding students of parts of the task they may have overlooked. At the end, groups generalized their ideas, used analogies, made inferences, generate questions, summarized results, and drew implications. Finally, the teacher drew conclusions based on the discussed subject and physical aspects of learning environment (Table 2).

To evaluate the students' performance, the participants (experimental and control groups) were given a pretest and posttest for measuring "the value added" by the program of the study. To this end, a pretest was given to both groups before the study to assess what they do in fact already know. The students also were tested after taking the study course to determine what knowledge they acquired and how much of an effect the teaching has had on them compared with when they first started the course.

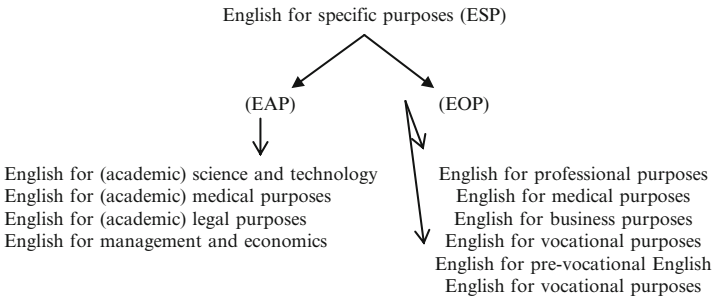

Fig. 2 Designed course

Table 2 Designing the course based on CLEs

Components	
Problem context	The time frame and physical resources surrounding the problem such as materials, performance environment, and community of practitioners were described
Problem representation	To represent the problems, a high-quality video, audio, and text and a brief story for introducing the problem and engaging students were used
Problem manipulation space	To describe the transformational interactions between the student and the object that the learner is acting on, an activity theory was defined. That is, the students were allowed to test the effects of their manipulations, receiving feedback through changes in the physical appearance of the objects they are manipulating or in the representations of their actions, such as charts, graphs, or notes
Related cases	To help students solve and understand the problem, few papers, CDs, and handbooks related to ESP were distributed. And, it was tried to involve the students
Information resources	A book (*Developments in English for Specific Purposes*) written by Dudley-Evans and St John (2005) was used
Cognitive tools	The participants were encouraged to use technology-supported learning tools such as tablet and phone pad
Conversation and collaboration tools	The students were divided into five groups and were asked to focus on one specific part individually and collaboratively. Learners write notes to the teacher and to each other about questions, topics, or problems that arise
Social/contextual support	The most important role of the teacher was to monitor and regulate the students' performance. He provided hints and helps, such as directing students to particular aspects of the tasks or reminding students of parts of the task they may have overlooked

6 Results

Tables 3 and 4 display the descriptive statistics on students' performance for both groups (pretest and posttest) through a *t*-test. Table 3 shows that there is no significant difference between two groups and they nearly have the same background knowledge.

Table 4 shows that the experimental group was better than the control group. That is, designing constructive learning environment affected students' performance. To deliver the best and most effective learning, exploiting all the possibilities of the Information Age, learning environment needs to reflect advances in new lesson plans, rich syllabus, and modern technology. They also need to provide a pleasant and comfortable environment for learning features to stimulate student's imaginations and show the students how to benefit academically from interaction with peers using suitable instructional tools. Open-plan learning areas provide individualized learning environment which also supports collaborative activities. More importantly, following two decades of rapid technological change and increasing student numbers, flexibility in the design of learning environment is urgent.

Table 3 Comparison of groups

Group	*N*	*M*	SD	Freedom rate	*T*	Significance level
Pretest constructive	40	49.45	9.20	55	0.482	0.544
Pretest traditional	40	48.67	8.70			

Table 4 Comparison of groups

Group	*N*	*M*	SD	Freedom rate	*T*	Significance level
Posttest constructive	40	77.55	7.55	55	0.199	0.049
Posttest traditional	40	61.67	8.11			

Collaborative, project-based learning teaches many of the skills through the active process of designing and developing interpretive and intellectual support systems. This learning process occurs through grouping students into various sized groups depending upon what learning activity is taking place. Guided instruction is often presented to students. Exploration and discovery can occur with or without teacher and can happen individually, in small groups and teams, or within larger groups (Wolff 2003). To this end, we should pay serious attention to new training programs. There are three reasons for evaluating training programs. The most common reason is that evaluation can tell us how to improve future programs. The second reason is to determine whether a program should be continued or dropped. The third reason is to justify the existence of the training department (Corporate University) and its budget. By demonstrating to top management that training has tangible, positive results, teachers will find that their job is more secure, even if and when downsizing occurs (Kirkpatrick 1998).

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The Impact of the Physical Learning Spaces on Learning Process

Mohsen Ghasemi Ariani

Abstract The present study explores the impacts of physical learning spaces on students' outcomes and learning process based on the Iranian junior high school students' ideas. It also draws on the ways in which specific environmental conditions impact upon student learning. The environmental conditions scrutinized are factors such as physical spaces in the classrooms, school built spaces, and school learning environmnets. Based on interviews with students and the analysis of their scores, the findings reveal that typical school spaces and classroom layouts vary between the students in ways that their outcomes are related to their understandings and philosophies of education and learning. Besides, the present study can encourage school planners and language teachers to pay serious attention to the psychological dimension of physical learning environments, which is often taken for granted despite its vital impact on learning process.

Keywords Physical learning spaces • Student achievement • Learning process

1 Introduction

The quality of learning space is significant in shaping students' beliefs about the subjects that they study and the whole education system (Zedan 2010). Learning space is a place where students congregate for some periods of time to take part in learning process. As well, the space created during the learning activities is considered as an important element in the learning process. And the essence of a learning space is the interaction between persons and the setting within which they are engaged (Ahmad et al. 2014). To examine the interrelationship between learning spaces and student outcomes, it is important to pay more attention to environmental conditions, environmental psychology, and building designs.

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Traditionally, learning spaces have been designed by traditional architects, and they generally mirror traditional rather than contemporary architectural and educational principles, often leading to the reproduction of the traditional model of schools in Iran. To this end, Iranian school designers and professionals should consider aesthetic and environmental sustainability issues and cooperate with experienced teachers emphasizing learning and architectural issues (Mortazavi 2011).

1.1 Literature Review

Temple (2007) and Keep (2002) refer to a number of sources that describe the ways in which specific environmental conditions impact upon student learning. The environmental conditions described are factors such as noise, temperature, air quality, ventilation, and lighting (Higgins et al. 2005; Lackney and Jacobs 2002; Earthman 2004). Earthman (2004) rates temperature, heating, and air quality as the most important individual elements for student achievement. Another line of research interest relates subjective perceptions of noise and noise annoyance to objective measures of noise. Dockrell and Shield (2004) conclude that the judgments of both adults and children correlate well with background noise, while noise annoyance is more related to peaks of noise and some noises are perceived as more annoying than others. In relation to student achievement, it is argued that day lighting offers the most positive effect (Earthman 2004). Engelbrecht (2003) argues that we have a basic, biological reaction to color and that "the psychological reaction to color does not preclude the basic biological reaction that stems from human evolution." Depending on the age of children, different colors are considered stimulating; younger children prefer bright colors and patterns, while adolescents prefer more subdued colors. Barrett and Zhang (2009) state that every effort should therefore be made in the design stage to create the ideal physical conditions for learning to take place. It can be argued that "appearance of the school is important in terms of the negative or positive messages students receive about themselves. Students internalize any reflections on the buildings or school on themselves as they and their teachers identify with their school, its image and reputation" (Blackmore et al. 2011). Rudd et al. (2008) and Waterhouse and Coopers (2010) also found that student engagement increased in newer, well-designed buildings. As well, a Canadian study by Roberts (2009) found that engineering assessments of facilities are unrelated to the quality of teaching and learning environments (QTLE) in schools but that the educators' assessments of school facilities are systematically related to the QTLE in schools. This highlights the fact that the educational purposes of schools need to be taken into account in order to understand the place and importance of facilities with relation to learning outcomes. A focus on educational relevance is more important than a purely engineering-based assessment. Besides, much of the most recent research is driven by the need to incorporate technologies of various forms within learning spaces and how this both demands new teaching practices and creates new possibilities. Contemporary computing or other technology education is more

ubiquitous since it is integrated across and into the curriculum. Computer use due to mobility of laptops, netbooks, and wireless is pervasive, and connectivity means blurring the lines between school, leisure, work, home, and spaces. The issue now is how to facilitate the use of mobile technologies throughout schools, in transition spaces, and in Internet cafes where educational and social interactions can be encouraged while privacy and safety are addressed (Cilesiz 2009).

2 Method

The present study is an attempt to explore how physical learning spaces have effect on students' outcomes and learning process. To this end, 100 Iranian students (third grade) of five junior high schools as a case participated in this study. All of them were male and their average age was 15. Choosing a case is not necessarily concerned with representativeness and typicality of the case but with its accessibility and the opportunity it provides to the researcher to learn (Stake 2000). Their classes were held 5 days a week, which was compulsory for all the students. The junior high schools in which the interviews were carried out were public schools. The students were asked to think about and raise their ideas about some aspects of the physical learning environment that contribute to or impede effective teaching and learning. Some questions such as "what makes a good school (physical) learning space; what influence do school (physical) learning spaces have on student learning outcomes; which elements of school learning spaces make the most difference to student behavior, learning, and why; and is changing the learning spaces 'worth doing' if it is done as a design process" were asked. In fact, they were encouraged to express their opinions about the impacts of (physical) school learning environments on student learning outcomes. Besides, components and elements of school learning spaces such as school built space and physical space in the classroom were explained. School built space includes school built environment, noise, lighting, color, and other design issues such as outdoor spaces. In addition, physical spaces in the classroom consist of tables and equipment, arrangement and layout, and information and communications technology (ICT). As well, the half-term exams administered to the students were standard teacher made. The data have been collected through interviews and the half-term exams. The interviews were recorded and analyzed.

3 Results

Studies about students' ideas conclude that the quality of the physical environments was the key element factor to them. But they do not affect their performance. In fact, they have other reasons for studying and progressing. They try their best for the purpose of obtaining some concrete goals such as a job, graduation, or to pass the course. Teachers and their methodologies and school management are important to

their parents in general. Students believe that school built environment and physical environment in the classroom are ideal factors that can have a motivational and psychological effect. Due to their sociological and political situations, they cannot expect the ideal elements all together. On the other hand, the following are the participants' ideas of learning environmental conditions: The majority of the students rate temperature, heating, and air quality as the most important individual elements. Concerns about exposure to chronic external noise lead to an effective reduction in learning progress.

Although the visual environment such as lighting and color affects students' ability to perceive visual stimuli and affects their mental attitude and performance, they had to not pay attention to these elements. The participants used to study hard in order to pass the course. Other issues in the design and layout of the whole school were mentioned as elements which might be important. Talton and Simpson (1987) comment that the classroom is the basic structural unit of our educational system and the nature of the classroom is clearly affected by the school design and objectives adopted at the school level. To the participants, they have never thought about ergonomic seating, positioning, and the arrangement of the students' desks and chairs. They had no ideas about them. One of the four key predictors of student performance in the building assessment scale of Tanner (2000) was availability of technology for teachers and students. Based on an interview with the students, computers in the classroom are a powerful educational tool, and their use is becoming gradually available in private schools. The students were not allowed to bring laptop, phone pad, and cell phone. Some of them were asked not to attend their classes because of cell phones and laptops that they brought inadvertently. Students asked for educational tools such as computer and communication technology since their public schools did not have modern ones. The participants had different reasons for studying hard and passing, some of them studied because of their family. They tried to get good marks to satisfy their parents. The other students studied hard because of better opportunities. When top students were asked to talk about the reasons of getting good marks and their connections to learning spaces, they said that they were expected and used to study hard. On the other hand, weak students believed that their family situation played an important factor. They did not know exactly whether components of school learning environments make the most difference to their outcome and performance in a better situation or not. However, they did like to study in comfortable learning spaces.

4 Discussion

Well-designed learning spaces have a motivational effect. Learning areas infused with natural light, for example, provide an environment that is easy and pleasurable to work in. A successful school is the result of an ambitious collaboration between school planners and teachers to construct a learning environment that addresses the needs of the twenty-first-century learners in a twenty-first-century world. It is

helpful to incorporate best practices of technology and new learning methodologies as well as a range of environmentally responsible design and construction features—indoors and outdoors. Schools should offer an opportunity to connect learning to the outside world and to bring environmental issues to life in the classroom. They should be in and of themselves inspiring and innovative teaching tools. Students should have unique opportunities to see how the world and its life forms and resources are interconnected and how one action can have an effect on other people and the environment (Microsoft Corporation 2008). The physical characteristics of learning spaces can affect students emotionally, with important cognitive and behavioral consequences. Spaces that elicit positive emotional responses may lead not only to enhanced learning but also to a powerful, emotional attachment to that space. It may become a place where students love to learn, a place they seek out when they wish to learn, and a place they remember fondly when they reflect on their learning experiences. In any learning environment, physical characteristics that cause discomfort can be expected to interfere with learning; those that produce positive emotional states can be expected to facilitate learning (Graetz 2006).

Research on the impact of information learning spaces on student learning outcome is not as voluminous in Iran. So, those responsible for designing learning spaces should be aware that today's incarnation of learning spaces requires additional study, since today's students spend an increasing amount of their time attending schools. On the other hand, researches on the effects of such environmental variables as light, temperature, and noise on learning have yielded some predictable results that are addressed through classroom design. Learning appears to be affected adversely by inadequate light, extreme temperatures, and loud noises—variables maintained within acceptable ranges in most school classrooms. In addition to environmental conditions and physical environment, information and communications technology and educational tools have great potential to enhance and transform instruction and should be used effectively in many Iranian public schools. Today's students should be allowed to use their devices in class to take notes, access materials and applications, and find relevant information. When all students in a classroom can access networked tools simultaneously, many collaborative learning and just-in-time teaching opportunities emerge (Graetz 2006).

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Preliminary Analysis of Learning Effectiveness Between the MIB and Non-MIB User

Muhd Iqbal Makmur and Ambikai S. Thurasingam

Abstract The higher education in Malaysia has vastly adapted quality assurance mechanisms in its programme design, module content, course delivery and assessment and evaluation methods. It has placed great emphasis on objective-based education (OBE) that requires students to understand the module learning objectives of the programme at the end of the learning process. A wide range of learning activities and pedagogical methods have evolved in this contemporary and virtual education system. Therefore, preliminary guidelines may help the students in preparation on their time management and learning process. The purpose of this study is to make a comparative analysis in learning effectiveness between the MIB and non-MIB users in the private universities in achieving their learning outcome. The expected outcome of this study is that the MIB users may exhibit a better learning effectiveness as compared to non-MIB users as they receive comprehensive initial information of the modules.

Keywords Module information booklet • MIB user • Non-MIB user • Learning outcomes • Learning preferences • Teaching method • Learning objectives

1 Introduction

Module information booklet (*MIB*) is a guideline that defines the comprehensive structure and content of a course. It is designed to illustrate synchronisation of programme to specific subject learning outcomes. In addition, it helps to map out clearly how resources (e.g. books, equipment, time), class activities (e.g. teacher-talk, group work, practical, discussions) and assessment strategies (e.g. tests, quizzes, homework) will be used to ensure that the process of learning meets its objectives of the course successfully. The MIB is usually an interpretation of a specification or syllabus and can be used as a guide throughout the course to monitor progress against the original plan. The MIB is the onset for the learning process

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whereby it is a pinnacle that can bestow an overview of the module that is being taught (Iqbal and Thurasingam 2014a).

In most educational institutions the scheme of work is used as part of planning an essential aspect of teaching and is even more effective when it is a process that is collaborative with your colleagues and students, therefore enhancing the effectiveness of your teaching (Mawer 1995). Schemes of work are a long-term planning solution, which identify the learning opportunities across a whole school year (Gower and Capel 2004). In the recent years the Accounting Education Change Commission (AECC), the American Accounting Association (AAA), and the major accounting firms (AAA 1996; AECC 1993) have identified five dimensions considered critical for effective teaching, and the Committee on Promoting and Evaluating Effective Teaching reaffirmed the importance of the five critical areas (AAA 1996). The five dimensions discussed above are designing/developing curriculums and courses, selecting and using appropriate materials for strong presentation skills, using suitable pedagogical methods and assessment devices, and providing guidance and advisement to students.

Furthermore, the instructor prepares the course syllabus for several stakeholders: students, colleagues, administrators and accrediting agencies. Jervis and Hartley (2005) suggest that faculty may use syllabi from other schools to aid in developing a course. Faculty and administrators often view the syllabus as a formal contract between the instructor and students. Unfortunately, when a procedural difficulty occurs in a course, the lack of information in the syllabus is often the source of the problem. According to Matejkab and Kurke (1994), an ideal course syllabus should include the instructor's plan of action for the course, the standard provisions for a contract between student and instructor, a statement of the course's general purpose, the instructor's orientation to the content and the information that should be given to the customer (i.e. the student).

However, Altman (1999) suggests that syllabus goals can only be achieved if the syllabus provides sufficient information; however, this may not be the only problem facing the instructor's syllabus. The instructor would expect students to read and remember the pertinent information they deem important. Even though an instructor may believe that all of the information in the syllabus is of great importance, it does not necessarily follow that the students will attach the same weight to that information neither would the students have achieved the learning outcome. Thereupon, the syllabus is also the yardstick of the course that may encompass a process orientation and how that determines your expectations of the students. It also explains the agenda for the course, how the course structure reinforces goals and objectives and how the activities and assignments will help them to meet both content and process goals. Therefore, the purpose of this study is to make a comparative analysis in learning effectiveness between the MIB and non-MIB users in the private universities in achieving their learning outcome.

2 Literature Review

It is cardinal and fundamental that teachers provide a framework for the course they will be teaching. Planning lessons is the result of a complex planning process that includes the yearly, term and unit plans. A daily lesson plan is a written description of how students will move towards attaining specific objectives. It describes the teaching behaviour that will result in student learning (Salaberri and Sánchez 2012). In contemporary social learning theories, learning is not configured as the sedimentation of knowledge and skills, but rather the acquisition of activities that allow for legitimate entry into a community of practice, through which an identity is gained. We acknowledge the importance of character formation as a 'professional' and of identity construction as a 'diagnostician' as well as 'interprofessional team worker' (Bleakley 2012). The lesson planning process is of vital importance for the successful development of the class (Salaberri and Sánchez 2012). A handful of teachers enter a classroom without some kind of plan. Lesson plans are systematic records of a teacher's thoughts about what will be covered during a lesson. Richards (1998) suggests that lesson plans help the teacher think about the lesson in advance to 'resolve problems and difficulties, to provide a structure for a lesson, to provide a "map" for the teacher to follow, and to provide a record of what has been taught' (p. 103). There are also internal and external reasons for planning lessons (McCutcheon 1980). Teachers plan for internal reasons in order to feel more confident, to learn the subject matter better, to enable lessons to run more smoothly and to anticipate problems before they happen. Teachers plan for external reasons in order to satisfy the expectations of the education authorities, programme requirements or principal and to guide a substitute teacher in case the class needs one.

Marshall et al. (2006) traced the origins of curriculum to its Latin roots, which means 'race course'. Indeed in many ways the curriculum is very similar to a race where there are a series of obstacles that need to be achieved in order to gain a qualification. The importance of scheme of work is to design it to make the teaching of my subject more manageable over a period of time. Planning can be regarded as a process of transformation during which the teacher creates ideas for a lesson based on understanding of learners' needs, problems and interests and based on the content of the lesson itself. Thereupon, this does not necessarily result in a detailed, written lesson plan. Many teachers teach successful lessons based on mental plans or on brief lesson notes. To boot that, what is crucial is not the extent and detail of the teacher's plan but the extent to which the teacher has developed ideas to pirouette a potential lesson (such as a textbook lesson) into the basis for an engaging and effective lesson (Richards and Renandya 2002). Lesson planning involves decisions about the pedagogical dimensions of the lesson, which can be called syllabus, scheme of work or even a more contemporary and comprehensive term module information booklet. Whence, another important aspect of a lesson concerns the management of learners during the lesson. This includes eliciting students' attention, maintaining their engagement in the lesson and organising them into pairs or groups. If these aspects of a lesson are not well handled by a teacher, much of the

time available for teaching can be lost in nonproductive activity. Farrell (2002) discusses the processes involved in the planning, implementation and evaluation of a lesson. At the planning stage, teachers need to think about questions such as what the objective(s) of the lesson will be, what materials and activities will be used, what type of interaction will be encouraged and how the learning will be monitored. Hence, the processes of curriculum development and syllabus design in teaching usually involve evaluating the needs of learners, developing goals and objectives, planning a syllabus, selecting teaching approaches and materials and deciding on assessment procedures and criteria.

In addition, Matejkab and Kurke (1994) suggest four identified major uses of a syllabus: (1) a contract between the instructor and the students, (2) a communication device that would connect the instructor to the students, (3) an instructional plan for the instructor and (4) a cognitive map for the students. Bers et al. (1996) have focused on accountability, emphasising the use of the syllabus as an administrative tool for the documentation of teaching effectiveness, which could therefore provide evidence for the accreditation of an institution or the performance evaluation of its instructors. Finally, Cullen and Harris (2009) claimed that the syllabus might gauge the mindset of the instructor, assessing whether the instructor was influenced by an instructional or a learner-centred paradigm.

Predominantly, a learning-centred syllabus will provide information on how to plan for the tasks and experiences of the semester, how to evaluate and monitor performance and how to allocate time and resources to areas in which more learning is essential. This information can help students develop self-management skills that are valuable beyond the demands of a particular course. When the students are familiar with the objectives and learning outcomes of the modules taught, the lecturer may find it user oriented while imparting the knowledge. This will enable the students to understand the application of each module to their job requirements and scope in future (Iqbal and Thuraisingam 2014a). On that account, the syllabus apart from being a contract between the lecturer and student also communicates much about the lecturers' attitudes towards students and learning. The way in which the engagement takes place helps students to understand whether the atmosphere of the class will be in a formal or informal manner, wherein it may acquaint the students with the logistics of the course. It is discernible that a comprehensive syllabus can detail this information so that students will apperceive their expectations and can be adapted and well groomed for each class meeting.

3 Methodology

This research is designed to make a comparative analysis in learning effectiveness between the MIB and non-MIB users in the private universities in achieving their learning outcome. The preparation and the designation of MIB and its syllabus contents may be different among other private higher institutions. However, the main

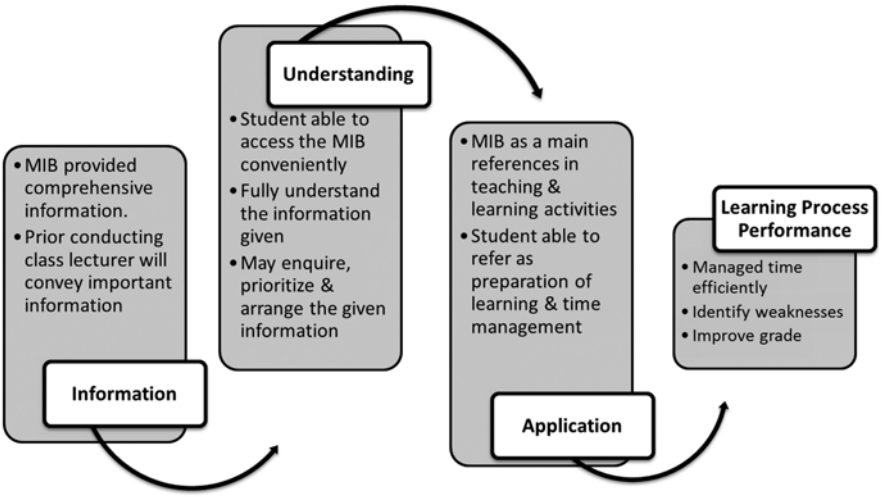

Diagram 1 A model framework for performance of learning process

contents such as learning objectives, learning outcomes, subject contents and assessment due dates are crucial information to be interpolated (Parkes and Harris 2002). In addition, a contract between the lecturer and the students, an instructional plan for the students and a cognitive map for the students are important to ensure the students are fully equipped with a proper academic guide. In tandem with the university's mission for lifelong learning, the academics need to reverberate on the learning preparations and students' understanding of the modules. Therefore, the following model framework was derived based on the research.

The diagram above is a simple *chronology* of learning process performance. It is constructed based on the three components of the study, namely, information gathered from the MIB by the learners, the level of understanding of the learning outcome and learning objectives as well as the level of application of the components of the MIB to their course of study. The initial setting-up and information delivery by the lecturers have enabled the students to set a level of preparedness of the module concerned as the students have acquired pertinent insights of the topics, learning outcome, relevant activities, assessments and specific deadlines. Easy accessibility and clear information will conjure better understanding of the module activities. This will assist the students in prioritising the information acquired to organise and gear up for the module. Hence, it will escalate the students' capability in the application of the contents of the module to ameliorate a taxonomic learning process. This has been discoursed further in the analysis below (Iqbal and Thuraisingam 2014b).[1]

[1] The research framework has utilized MIB model framework in assuming the similarity concepts of utilization for general syllabus contents. This generalization were similar to Matejkab and Kurke (1994).

Thus, it can be concluded using a simple equation that

$$\text{Learning} = \alpha + \beta_1 \text{Info}_1 + \beta_2 \text{Understand}_1 + \beta_3 \text{Apply}_1 + \varepsilon \quad (1)$$

3.1 Data and Procedure

The data were collected from a few higher education institutions in Klang Valley. Prior to the collection of the data, syllabus physical comparisons were made to identify the common information and differences between practices. In setting on preliminary research, the survey strategy was whereby questionnaires were distributed to gather quantitative data on the participants' perceptions and other information related to the research objectives. The sample based on 200 undergraduate students and the respondents for this study was selected through a convenience sampling within the MIB (Taylor's University) and non-MIB user (other higher institutions).

The questionnaire consists three parts of questions for MIB and non-MIB user, (1) information of the syllabus, (2) discussion of the syllabus and (3) the utilisation of the syllabus in the learning process. This study has demonstrated descriptive analysis to highlight the perception in utilising the MIB to determine the level of preparedness.

4 Analysis and Results

Taylor's University has embarked in deploying MIB for all of its programmes to facilitate students with pertinent and relevant information on its module contents. The comprehensive efforts by lecturers in compiling important information as such MIB to comprehend its benefits to students may not be achieved if students' perception is not in tandem with the understanding and application of this as a tool for learning.

Table 1 illustrates the depth of information inserted in MIB as a proper guidance throughout the semester. More than 95 % of both users agreed that the provided information was sufficiently informative, and half of them agreed that they have received detailed information. However, the comprehensive understanding in syllabus components exhibits narrow differences. Nevertheless, crucial components such as learning objectives, learning outcomes, subject contents and assignment due date are included and have been explained clearly. This aligned with Matejkab and Kurke (1994) who have suggested four important components in the syllabus.

In Table 2, an average of more than 60 % of the students agreed that the lecturer(s) has discussed all major components in the syllabus contents and how it can be applied in the learning process. This result may reflect on the traditional culture in first day of class practices. However, the percentage of discussion is perceived

Table 1 Comparative of syllabus components

Components	Brief		Average		Detailed	
	MIB	*Non-MIB*	MIB	*Non-MIB*	MIB	*Non-MIB*
Learning objectives are stated	5.0	*0.0*	29.8	*34.9*	65.3	*65.1*
Learning outcomes are stated	4.1	*1.2*	39.7	*27.9*	56.2	*70.9*
All topics in the syllabus are stated	4.1	*1.2*	24.0	*32.6*	71.9	*66.3*
Assessments are stated	3.3	*2.3*	29.8	*24.4*	66.9	*73.3*
All activities are stated	9.1	*4.7*	33.9	*40.7*	57	*54.7*
All deadlines are stated	2.5	*2.3*	22.3	*31.4*	75.2	*66.3*
Instructions on activities are stated	5.8	*5.8*	35.5	*36*	58.7	*58.1*

differently between institutions. The MIB users have 'stronger agreement' to believe that the lecturers have explained the provided booklet in detail as compared to the non-MIB users. This could be due to the fact that the information included is comprehensive and pertinent for the journey of learning. Meanwhile, the 'strong agreement' is less among non-MIB users and may reflect the reasons that the information may not be comprehensive or only basic information were included. Moore and Gayle (2010) have highlighted some challenges in an integration of full understanding of information in learning syllabus, but Olson (2009) indicates that syllabus outcomes could be the useful litmus test for pedagogical practices. Almost 80 % of the students agreed lecturers have explained at the beginning of the class, but the percentage reduced in setting reminder after the class. In addition, more than 70 % of the students agreed that the explanation of the class activities and assessments instruction is clear and has been followed religiously in all tutorials. Whence the comparison discussion of syllabus contents was also observed from the physical comparison made in the handout which the four (4) important contents are available; however, the details are probably not being compiled along with it.

In Table 3, although more than 60 % of the MIB and non-MIB users were able to understand both learning objectives and outcomes, however, majority of the users are enlightened and have perspicuously understood the list of topics and are able to conform to available assessments and deadlines. Overall, more than 30 % of the users did not optimise and were unable to appreciate the benefits in deploying syllabus handouts. This might be due to the result that the students may be selective in extracting the 'only important' information to them. Finally, although the majority of 60 % have agreed that the MIB helped them in their learning process, up to 40 % of students are still uncertain. These results however are significant to MIB users, whereby they strongly agree that comprehensive information in a single booklet helps in their learning process. Hence, the partially unexplained percentage could be explained by other tools which may help in the learning process such as technology, environment and space of the classroom (Ceppi and Zini 1998; Jamieson 2003; Norton 2009; Morgan 2011).

The regression analysis in Tables 4 and 5 indicates regression analysis of the three major components which has been illustrated in a model framework between MIB and *non*-MIB user in Eq. 1.

Table 2 Discussion of syllabus contents throughout semester

Discussion of MIB	Strongly disagree		Disagree		Somewhat agree		Agree		Strongly agree	
	MIB	*Non-MIB*	MIB	*Non-MIB*	MIB	*Non-MIB*	MIB	*Non-MIB*	MIB	*Non-MIB*
Lecturer has explained the component	0.0	*0.0*	7.4	*1.2*	19.8	*32.6*	42.1	*54.7*	30.6	*11.6*
Lecturer has explained how to use	0.0	*0.0*	10.7	*11.6*	28.9	*29.1*	33.9	*46.5*	26.4	*12.8*
Lecturer has explained the LO	0.0	*0.0*	10.7	*10.5*	18.2	*32.6*	46.3	*34.9*	24.8	*22.1*
Lecturer has highlighted dateline	0.0	*0.0*	5.8	*5.8*	17.4	*20.9*	38.8	*47.7*	38.0	*25.6*
The students to refer at beginning of the class	0.8	*0.0*	5.0	*4.7*	14.9	*33.7*	38.8	*37.2*	40.5	*24.4*
The students to refer at end of the class	3.3	*0.0*	14.0	*15.1*	25.6	*30.2*	33.1	*37.2*	24.0	*17.4*
Lecturer has explained clearly the assessments' instruction	0.8	*0.0*	5.0	*3.5*	21.5	*33.7*	35.5	*45.3*	37.2	*17.4*
Lecturer has followed thoroughly the activities	0.0	*0.0*	3.3	*5.8*	21.5	*38.4*	42.1	*40.7*	33.1	*15.1*
Lecturer has followed the topics thoroughly	0.0	*0.0*	0.8	*3.5*	21.5	*29.1*	40.5	*47.7*	37.2	*19.8*
All tutorials are conducted as planned	0.0	*0.0*	4.1	*7.0*	20.7	*29.1*	36.4	*47.7*	38.8	*16.3*

Table 3 The utilisation of syllabus contents in the learning process

Student perception on MIB	Strongly disagree		Disagree		Somewhat agree		Agree		Strongly agree	
	MIB	*Non-MIB*	MIB	*Non-MIB*	MIB	*Non-MIB*	MIB	*Non-MIB*	MIB	*Non-MIB*
Understand the learning objectives	0.8	*0.0*	2.5	*3.5*	31.4	*34.9*	47.1	*46.5*	18.2	*15.1*
Understand the learning outcomes	0.0	*0.0*	4.1	*2.3*	28.9	*37.2*	49.6	*45.3*	17.4	*15.1*
Well informed with all the topics	0.8	*0.0*	3.3	*4.7*	23.1	*29.1*	42.1	*45.3*	30.6	*20.9*
Well informed with the assessments	0.0	*0.0*	0.0	*3.5*	25.6	*26.7*	37.2	*52.3*	37.2	*17.4*
Well informed with all activities	0.0	*0.0*	0.0	*8.1*	28.1	*31.4*	43.0	*40.7*	28.9	*19.8*
Well informed with all deadlines	0.0	*0.0*	0.8	*2.3*	19.8	*26.7*	43.0	*46.5*	36.4	*24.4*
Learning process is more application oriented	0.0	*0.0*	3.3	*7.0*	28.9	*37.2*	39.7	*41.9*	28.1	*14.0*
Able to make an early preparation	0.8	*0.0*	2.5	*3.5*	27.3	*38.4*	42.1	*39.5*	27.3	*18.6*
Able to keep track on the topics in the syllabus	0.8	*0.0*	3.3	*8.1*	23.1	*31.4*	49.6	*45.3*	23.1	*15.1*
Able to relate the LO	0.8	*0.0*	5.0	*3.5*	27.3	*40.7*	47.9	*41.9*	19.0	*14.0*
Able to identify the weakness/strength of each topic	0.8	*0.0*	8.3	*10.5*	38.0	*37.2*	33.1	*36.0*	19.8	*16.3*
Has improved the learning process	0.8	*0.0*	1.7	*7.0*	35.5	*36.0*	36.4	*38.4*	25.6	*18.6*

Table 4 Regression analysis model (MIB)

Variable	Coefficient	Std. error	t-Statistic	Prob.
Information	0.265410	0.117474	2.259300	0.0257*
Understand	0.001012	0.101601	0.009962	0.9921
Application	0.726789	0.091142	7.974208	0.0000*
R-squared		0.562474		
Adjusted R-squared		0.551255		

The asterisks (*) denotes 5 % significant level

Table 5 Regression analysis model (*non*-MIB)

Variable	Coefficient	Std. error	t-statistic	Prob.
Information	0.125249	0.178776	0.700595	0.4855
Understanding	0.064122	0.147593	0.434450	0.6651
Application	0.846549	0.150992	5.606570	0.0000*
R-squared		0.630379		
Adjusted R-squared		0.616857		

The asterisks (*) denotes 5 % significant level

In Table 4, the MIB user finds that the given information provided is systematically comprehensive for study preparation. The syllabus reminder and announcement information have value added towards student learning acceptance. It enables the user to cope with the course syllabus. Besides that, the MIB has significant influence on how the user applies its contents into their study preparation. Hence, it is quite evident from the analysis that the MIB user focuses most of its attention to the prerequisite information of the module and how to apply contents of MIB into their study, although the understanding of the learning objectives and outcomes seems to be insignificant at 5 % significant level. The R-squared indicates that 50 % of the variables facilitate the students' learning process.

On the other hand, Table 5 indicates 5 % significant level on the application towards the learning process. Meanwhile, the findings for non-MIB users have rejected the information and understanding component. This may indicate that the students are not paying much attention towards information reminders and announcements. The latter findings on understanding portray similar result as those who utilise MIB, whereby the students are still weak in acquiring the learning objectives and outcomes of the syllabus. However, the provided information (syllabus topics, assessment and dateline) are independently retrieved by the students for learning preparation.

The students' responses indicate that the MIB is a comprehensive reference to accumulate all pertinent and relevant information of the module contents. The detailed information provided in the MIB if acceptably understood which enhances rigorous application of the MIB prior to and during the course of the study. Furthermore, the announcements also have a significant impact in explaining the learning process. Meanwhile, the non-MIB users seek reference from the 'simplified' version of the module contents.

5 Conclusion

The finding indicates that preliminary comparative analysis on students' learning effectiveness reflects that the MIB users have comprehensive and detailed information on the syllabus contents, learning objectives, learning outcomes, assessments criteria, submission dates and other relevant activities. By fair means or foul, the students seem to be acclimatised to the hypothesised information and instructional blueprint. Therefore, they have extracted minimum important information such as topics in the syllabus, assignment components and its deadline. Henceforth, the learning outcomes and objectives, the application and other ways to utilise the MIB have been less focused by the students in other institutions. According to Mezirow's transformative learning theory, it is obvious that teaching/learning in a modern educational system needs to be improved; therefore, enhancement of the existing system should cater for the students' direct involvement in their personal development, which means consequently utilising the MIB can be a preliminary step to achieve this in the learning environment (Herlo 2012).

On that account, it can be a watershed on the relevant educational authorities to enact policies to standardise and scrutinise the content and application of the syllabus and its contents. It is evident that the MIB serves as a 'contract' between the lecturer and students as it emphasises the complete conduct of the module and portrays the mapping of capabilities expected and required from a graduate. In preparation of the MIB, focus is directed at learning outcomes, module contents, graduate capabilities, assessment components and marking rubrics, datelines, weekly schedule, assessment feedback and assignment cover templates, rules on plagiarism and other pertinent details of the module.

Further, the non-MIB serves as a reference for module contents and dateline, but may not have a severe impact on the learning process. Despite this, it is still being utilised by the students as mode of reference.

Nonetheless this study was tossed with limitations, such as the ability to obtain data and information from other private institutions as there was no direct access or contact to the students. Although much preeminence was placed in obtaining primary data from the survey, however, we had been snagged with buttonholes and challenges. This may procure another study on the application and usage of the MIB between different levels of undergraduate students.

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Effects of Spreadsheet Towards Mathematics Learners' Problem Solving Abilities

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Abstract This paper reports the findings of a study exploring the effects of using spreadsheet towards preuniversity students' problem solving abilities. The sample of this quasi-experimental study comprised 64 preuniversity students from a private college in Malaysia. The experimental group was taught the topic *limits* using a spreadsheet module while the control group was taught using the traditional module. Observation was done throughout the treatment, and data about problem solving abilities was collected, analysed and transcribed for differences in both groups. The results revealed the following differences between both groups: (a) number of correctly solved problems, (b) problem solving strategy, (c) preference in problem and solution presentation and (d) priority in problem solving.

Keywords Problem solving • Spreadsheet • Limit of sequence

1 Introduction

Historically, there have been various views about problem and problem solving. Polya (1945) developed the first framework for classical problem solving, which addressed a linear process of four steps, namely, (a) understanding the problem, (b) devising a plan, (c) carrying out the plan and (d) looking back. He drew out that problem was an obstacle which could not be answered using existing knowledge and that problem solving was an activity of finding a general method (which he termed as "heuristics") to overcome the obstacle. Mayer (1985) supported part of the above views. To him, problem was not only an obstacle but also the difficulty in finding the method of solution. On the other hand, Stanic and Kilpatrick (1989) had different points of view, who suggested that problem could be routine (required by the curriculum) or nonroutine (not required by the curriculum). They also pointed

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out that solving nonroutine problems required higher-order thinking compared to solving routine problem. However, problem solving could be learnt as by solving both types of problems.

These views of classical problem solving have driven the worldwide mathematics curriculum to include the component of problem solving ability. It is believed that learners develop their cognitive through applying existing knowledge and newly built ideas to a new problem situation (Schoenfeld 1992; Stanic and Kilpatrick 1989; Yeo 2009). The connection between the existing knowledge, newly built ideas and mediating function of new problem situations was described by Polya (1945), who pointed out that one had to first utilise his existing knowledge to understand a new situation and to formulate some plan to work on, and then he constructed new ideas from the existing knowledge to overcome the difficulties experienced throughout the execution of the plan.

Despite that a new problem serves as a learning stimulus, students nowadays still find solving a problem using mathematics to be difficult. The research done by Yeo (2009) revealed that students lack of the following problem solving abilities: (a) comprehending the problem posed, (b) planning for strategy of problem solving, (c) translating a problem into mathematical form and (d) using the correct mathematics. Therefore, several researches have been carried out to find ways to enhance problem solving abilities, one of which is the incorporation of technology in mathematics education. This paper addresses the potential of electronic spreadsheet (or simply "spreadsheet" in this paper) in enhancing problem solving, specifically to explore the effects of spreadsheet towards mathematics learners' problem solving abilities.

2 Literature Review

Researches about the use of the spreadsheet in mathematics education could be traced almost 20 years. Furina (1994) conducted a teaching experiment and clinical interview on five participants to explore the effect of regular use of a spreadsheet on students' concept image of *limit*. The study discovered four major types of schemes used by the participants in solving some problems, which she named as algebraic scheme, numerical scheme, neglecting small terms scheme and dominant terms scheme. The participants' algebraic scheme was so dominant that the extensive use of spreadsheet did not change their mind of choosing alternatives other than algebraic manipulation. However, their numerical scheme still enabled them to perceive numerical proof as a tentative proof.

Meanwhile, Wilson et al. (2004) implemented a spreadsheet module, designed to enhance learners' generalisation through symbolising a general rule by writing programming language, to a group of year 7 pupils for a total of almost 12 h over 1 year. Semi-structured interviews were then conducted to collect the data about their responses to a spreadsheet environment. Three features of spreadsheet environment shaping pupils' generalisation were identified, i.e. the focus on calculation, use of notation and feedback. These features also supported them to generalise in paper-and-pencil environment. Wilson et al. (2005) further revealed that spreadsheet

served as a mediator to understand algebra through varying the cells and through naming a column. The first mediating function helped them make relationship between variable cell in spreadsheet and variable in algebra by changing number in a single cell while formula does not change and filling down a series (dragging) to generate a list of numbers using the same formula. The second mediating function helped them identify the variable by defining names for some highlighted columns.

Calder et al. (2006) compared the pedagogical functions between spreadsheet and traditional teaching method towards conjecture formation. They discovered that spreadsheet did provide distinctive response in the social interaction which influenced the conjecture formation. Students interacted with spreadsheet through visual and tabular representation while solving a problem. Furthermore, students' response of generalisation was immediately evoked in explicit or implicit way. The explicit way included getting formula to model the problem, whereas the implicit way included observing the iterative processes while filling down. Lastly, they also reported that the use of spreadsheet terminology might lead students to be more successful in making conjecture.

These studies seem to imply that spreadsheet facilitates mathematics learning. However, does it mean that one can solve a problem without difficulties? Problem solving relies very much on learners' coordination of existing knowledge with appropriate skills (Yeo 2009). Good commandment of a concept without proper skill brings about difficulty in the start of problem solving, and good skills without proper notion of a concept bring about misleading direction when solving problems. Although spreadsheet is common in mathematics classroom, whether it gives challenges towards problem solving is not well understood, considering the capability of using the technology. This paper sheds lights in understanding how problem solving abilities can be acquired in a spreadsheet environment.

3 Methodology

3.1 Sample and Location

A class of 64 preuniversity students of a private college in Malaysia took part in the research. The group had varied academic capabilities which were accessed through monthly tests, quizzes, assignment and etc.

3.2 Spreadsheet Module and Traditional Module

Traditional module and spreadsheet module were developed for this research, both centring on $\varepsilon - N$ definition of *limits* (or the formal definition of *limits*) which sounds like the following:

> We call a sequence $\{a_n\}$ to be convergent to a real number A if for any positive number ε, there is a natural number N such that $|a_n - A| < \varepsilon$ for all $n \geq N$". (Apostol 1981, p. 70)

Through both modules, participants were expected to learn the concept of *limit* from various perspectives such as (a) the relationship between *limit* and cluster points and asymptotes, (b) convergence and divergence of a sequence, (c) uniqueness of the *limit* and (d) distributivity of the operations involving *limit*. Both modules consisted of 11 worksheets containing same set of learning outcomes and problems of the day which were derived according to the respective learning outcomes (see Appendix). However, the implementation of the modules was different; while the traditional module employed lecture notes about the topics and adopted direct teaching and learning, the spreadsheet module employed procedures of spreadsheet activities and adopted experimentation. Both modules were inter-rated by three senior lecturers from the college having at least 20 years of experience in teaching mathematics. Generally, they gave positive feedback in terms of content, instructions, levels of difficulty and variety of the questions.

3.3 Data Collection and Analysis

All participants were divided evenly into the experimental group (spreadsheet module) and the control group (traditional module). Each group comprised balanced combination of low, moderate and high performers. In each group, they were then further divided evenly into several subgroups, each of four members, for discussion activities. Both groups then underwent an 8-week period of treatment, 2 days a week and 30 min per day. Some worksheets required more face-to-face sessions to complete. All scenes of the treatments were videotaped, and all forms of written responses by the participants such as their worksheets and screenshot of spreadsheet were collected. Field notes about the observation of participants' interactions were also taken. These data was then transcribed and analysed for problem solving abilities.

4 Results and Discussion

4.1 Number of Correctly Solved Problems

The numbers of correctly solved problems of the day in both groups are summarised in Table 1. Both groups showed gradual score increment across the period of study, indicating that both modules resulted in some improvement in terms of problem solving. However, the rate of increment within the experimental group was higher than that within the control group; the scores obtained by the experimental group increased from 6.3 to 68.8 % at a rate of approximately 6 %, whereas the scores obtained by the control group increased from 6.3 to 15.6 % at a rate of approximately 1 %. The experimental group was said to gain problem solving abilities at a faster pace compared to the control group.

Table 1 Number of correctly solved problems in the experimental and control groups

W		1	2	3	4	5	6	7	8	9	10	11
E	*n*	2/32	2/32	3/30	3/32	3/32	8/32	10/30	15/31	20/32	20/32	22/32
	%	6.3	6.3	10.0	9.4	9.4	25.0	33.3	48.4	62.5	62.5	68.8
C	*n*	2/32	3/32	2/32	2/29	3/31	4/32	3/30	4/31	4/30	5/32	5/32
	%	6.3	9.4	6.3	6.9	9.7	12.5	10.0	12.9	13.3	15.6	15.6
% *D*		*E* = *C*	*E* < *C*	*E* > *C*	*E* > *C*	*E* < *C*	*E* > *C*	*E* > *C*	*E* > *C*	*E* > *C*	*E* > *C*	*E* > *C*
		0	3.1	3.7	2.5	0.3	12.5	23.3	35.5	49.2	46.9	53.2

W worksheet, *E* experimental group, *C* control group, *n* number of correctly solved problems, % *D* difference in percentage of number of correctly solved problems

The score comparison between both groups was not obvious in the period from Worksheets 1 to 5. However, the experimental group obtained higher score than the control group after Worksheet 6. In addition, the score differences between both groups in each session were in increasing trend after Worksheet 6 and it reached 53.2 % in the end which was the highest. These suggested that the experimental group would perform better than the control group after a period of time and that the experimental group was able to solve more problems correctly in the end of the treatment.

It is essential to point out that this experiment focussed on the chronological development in problem solving abilities and that the instrumentation was not designed to obtain quantitative data related to problem solving. Therefore, the significance of the score differences could not be determined. Nevertheless, the overall data above suggested that spreadsheet gave a positive effect to the problem solving abilities.

4.2 Problem Solving Strategy

For the convenience of readers, some participants' written response samples and conversation excerpts will be displayed. The name of the participants follows in this way: Ex-*X* means the experimental group and Co-*X* the control group.

During Worksheets 1–5, both groups used algorithms as the main method of problem solving. Most of them tended to provide solutions in the form of systematic algebraic steps which involve previously learnt theorems (see Table 2). It was probably due to their academic background; they had been exposed to the traditional teaching and learning throughout their school life. The traditional teaching and learning of Mathematics in Malaysian schools have always been emphasising on step-by-step solution, with assumption that they had already commanded sufficient prerequisite theorems. However, there were some participants unable to relate those theorems to the problem even though they have learnt previously. Table 2 shows that some participants from the experimental group had got stuck in halfway possibly because they did not use theorems about absolute numbers.

Table 2 Written responses of experimental and control groups in Worksheet 3

Experimental	Control
Worksheet 3: $\lim_{n\to\infty}\left(1+\frac{1}{n+1}\right)$?	Worksheet 3: $\lim_{n\to\infty}\left(1+\frac{1}{n+1}\right)$?
$\left\|\left(1+\frac{1}{n+1}\right)-1\right\|<\varepsilon$ $\left\|\frac{1}{n+1}\right\|<\varepsilon$???	$n\to\infty \Rightarrow \frac{1}{n+1}\to 0 \Rightarrow 1+\frac{1}{n+1}\to 1+0=1$ $\therefore$ Hence, $\lim_{n\to\infty}\left(1+\frac{1}{n+1}\right)=1$

Fig. 1 An excerpt of conversation with participants Ex-*A* and Ex-*B* in group discussion

Worksheet 1: Whose statement do you think is "more correct"? Why?

Ex-*A*: I do not think John is right as we know that the sequence can reach the smallest numbers 0, which is lower than 1.

Ex-*B*: I agree with you. When we sketch the graph(*showing a graph sketched on a piece of paper*), we will get asymptote 0 instead of 1.

Me : Which part of spreadsheet did you get these information.

Ex-*A*: We did not see it actually.

Furthermore, the observation of the experimental group during this period revealed that they did not use the data obtained from the spreadsheet in their solutions. This was identified as they did not discuss the results obtained from the spreadsheet in the group discussion (see Fig. 1). This was totally opposite to what had been expected because the spreadsheet procedures were purposely designed to assist them to generate useful data to solve a problem. They were suspected to follow the procedures in the worksheet without making clear about their meaning while carrying out the activities and thus unable to relate the problem to the results they have obtained. In the end of each worksheet, they either left the problem unsolved or wrote very little and unrelated sentences (see Fig. 2).

During Worksheet 6 and onwards, the control group's strategies in solving problems did not vary much as like earlier worksheets. Algorithm was still the most commonly employed method. However, several changes were detected in the experimental group. Not only did they follow the spreadsheet procedures and formulate a solution to the problems, but they also generated more specific cases to refine their solution (see Table 3). This was not common in the control group. It seemed that experimental group had some initiatives in looking back their solution and in find-

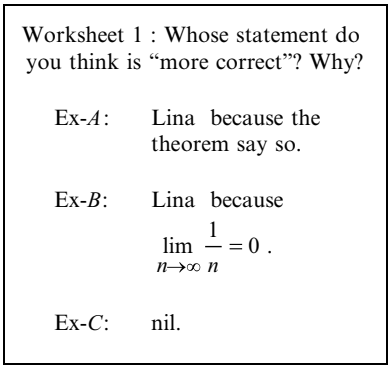


Fig. 2 Samples of participants Ex-*A*, Ex-*B* and Ex-*C* written response in the worksheet

Table 3 Group discussion conversation excerpts of experimental and control groups in Worksheet 6

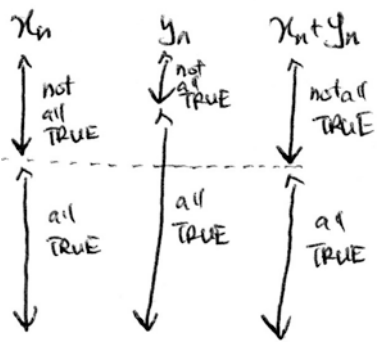
Experimental	Worksheet 6: How many limits can a sequence have?	
	Ex-*D*:	This is what we have got from the screen. In a piecewise-defined sequence, we can get all TRUE output only when limits of all functions in it are equal
	Ex-*E*:	True. I think each sequence can have only one limit
	Ex-*F*:	Is it too early to conclude? There could be sequences having two different limits that produce all TRUE if sufficiently large numbers of n is allowed. Just that we have to find out what the functions are
	Ex-*E*:	Then we have to find out for two cases, i.e. sequence of one limit and that of more than one limit
Control	Worksheet 6: How many limits can a sequence have?	
	Co-*A*:	I think we can use method of contradiction. Let us assume there are two limits, says M and N. Then, every interval containing M and N would have their own interval of n. Then I do not know how to proceed already

ing more variables or cases to judge the validity of the solution. Worksheets 1–5 were believed to be a transition period to the group in which the participants attempted to get adapted to this different form of teaching and learning.

4.3 Preference in Problem and Solution Presentation

Different from the control group, the experimental group preferred to present their problems and solutions in the form of two-dimensional representations such as pictures, concept maps and tables (see Table 4). According to Calder et al. (2006), these two-dimensional representations were conducive in enhancing their problem solving abilities due to the array structure and the dragging effect of spreadsheet. Also,

Table 4 Written responses of experimental and control groups in Worksheet 7

Experimental	Control
Worksheet 7:	Worksheet 7:
$\lim_{n\to\infty}(x_n + y_n) = \lim_{n\to\infty} x_n + \lim_{n\to\infty} y_n$. Why?	$\lim_{n\to\infty}(x_n + y_n) = \lim_{n\to\infty} x_n + \lim_{n\to\infty} y_n$. Why?
	Let $\lim_{n\to\infty} x_n = X$ and $\lim_{n\to\infty} y_n = Y$ Hence, we have $\lvert x_n - X \rvert < \varepsilon$ for $n \geq N$ and $\lvert y_n - Y \rvert < \varepsilon$ for $n \geq N$ $\therefore \lvert (x_n + y_n) - (X + Y) \rvert < \varepsilon$ for $n \geq N$

they used these representations more consistently throughout Worksheet 6 and onwards, indicating that they achieved some satisfaction that enhanced their understanding (Tall 1976).

4.4 Priority in Problem Solving

During Worksheets 1–5, there seemed to have no or very little difference in the priority of problem solving between the experimental and control groups. Differences were identified during Worksheet 6 and onwards and illustrated using problem solving models (see Table 5). While the experimental group prioritised the new problem situation, the control group gave priority to the methods of solution.

The experimental group tended to split a problem into several subproblems to solve. The central question commonly put forward by this group was "what do I need to solve before solving this problem". By identifying the intrinsic mathematical structure of a problem, they formulated subproblems, and the solutions of the subproblems or even the subproblems themselves were then triangulated before making a conclusion (see Table 6). Hence, this group relied very little on prerequisite theorems.

Different from the experimental group, the control group tried to figure out one or several methods that they think suitable to solve a problem. The central question commonly put forward by this group was "what method should I use in order to get the answer". Depending on their satisfaction towards the solution, more methods could be proposed to a single problem. Furthermore, the proposed methods were

Table 5 Problem solving model used by experimental and control groups

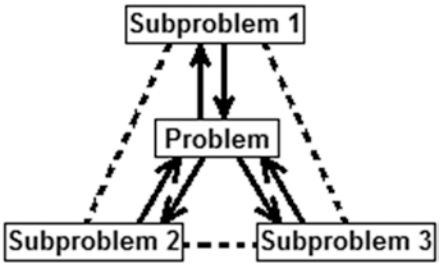
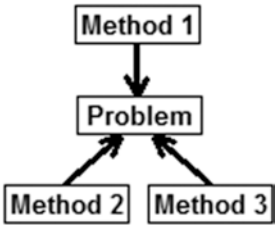
Experimental	Control
	

Table 6 Group discussion conversation excerpts of experimental and control groups in Worksheet 10

Experimental	Worksheet 10: $\lim_{n\to\infty}(-ne^{-n})$?	
	Ex-*G*:	This function composed of two functions $-n$ and e^{-n}. If according to the theorem, it has no limit because $\lim_{n\to\infty}(-n)$ does not exist. However, the value of the limit is 0 based on what we see from the screen (spreadsheet). I think there must be something to do with the property of e^{-n} and I am going to do several tests to verify
Control	Worksheet 10: $\lim_{n\to\infty}\left(-ne^{-n}\right)$?	
	Co-*B*:	It has no limit because $\lim_{n\to\infty}\left(-ne^{-n}\right)=\lim_{n\to\infty}(-n)\times\lim_{n\to\infty}\left(e^{-n}\right)$ and $\lim_{n\to\infty}(-n)$ has no limit
	Me:	But according to L'Hospital's Rule, $\lim_{n\to\infty}\frac{-n}{e^n}=\lim_{n\to\infty}\frac{-1}{e^n}=0$
	Co-*C*:	I do not understand this. We have never heard of this rule. Is this question too difficult for us?

almost independent to one another, i.e. the outcomes of one method were not related to other methods (see Table 5). Therefore, this group relied very heavily on external information, such as their existing knowledge, which has very little relation to the problem. This might be disadvantageous because without a properly learnt concept or theorem, they would fail to start or proceed further in a problem solving (see Table 6).

5 Conclusion

Few key results were noted in this study: (a) the experimental group solved more problems correctly than the control group did; (b) in terms of problem solving strategy, the experimental group tended to generate more cases to refine problems and

solutions, whereas the control group tended to use previously learnt theorems or axioms; (c) in terms of preference in problem and solution presentation, the experimental group tended to use pictures, concept maps and tables, whereas the control group tended to use line-by-line algebraic computation; and (d) in terms of priority in problem solving, the experimental groups tended to prioritise the problem and the goal(s) of the problem, whereas the control group tended to prioritise the methods of solution.

These results suggest that spreadsheet environment scaffolds learners' acquisition of problem solving abilities through varying existing heuristics or developing new heuristics. The flexible use of heuristics enhances development of higher-order thinking as it involves coordination between existing knowledge and newly constructed knowledge to a problematic situation (Schoenfeld 1992; Stanic and Kilpatrick 1989; Yeo 2009). Seeing the effectiveness of spreadsheet to problem solving abilities compared to traditional method, this study draws an important implication for curriculum-maker and teachers that the incorporation of the problem solving curriculum to mathematics classroom becomes possible with aids of technologies.

Appendix: Content of Spreadsheet and Traditional Module

W	Learning outcome	Problem to be solved
1	Judge the validity of limits with reference to the formal definition	Lina and John are arguing with the limit of $a_n = \frac{1}{n}$ as n becomes large. Lina says that the limit is 0 but John claims that the limit *could be* 1. Whose statement do you think is correct? Why?
2	Identify the significance and relationship of ε and N in the formal definition	In the previous task, Lina and John were arguing with the limit of $a_n = \frac{1}{n}$ as n becomes large. Lina said that the limit should be 0 but John said that the limit *could be* 1. From the activity, you saw that *Lina's statement is "more correct"* due to more TRUE. However, there is *no TRUE* for Lina when $\varepsilon = 0.1$. Do you think that Lina's statement is still correct? Why?
3	Prove the implication that if the limit of a sequence exists and is known, then the limit is the horizontal line clustered by infinitely many points	What can you say about the relationship between the limit of a sequence *an* and the clustered value of its scatter plot?
4	Predict the limit of a sequence geometrically	Explain how the limit of a sequence *an* can be obtained from its scatter plot?

W	Learning outcome	Problem to be solved
5	Prove the implication that if there exists no horizontal line of clustered points, then the limit does not exist	From previous activities, we know that if *the limit of a sequence is A, then the horizontal line y = A would be clustered by infinitely many points*. How about if we are not able to identify a horizontal line of clustered points, can we say that a limit does not exist? Why?
6	Disprove the implication that if $y = A$ is a horizontal line of clustered points, then the limit of the sequence is A	From previous activities, we know that if *the limit of a sequence is A, then the horizontal line y = A would be clustered by infinitely many points*. How about if $y = A$ is a horizontal line of clustered points, can we say that the limit of the sequence is A? Why?

Let $\{x_n\}$ and $\{y_n\}$ be two sequences of real numbers in such a way that $\lim_{n\to\infty} x_n = X$ and $\lim_{n\to\infty} y_n = Y$ where $X, Y \in \mathrm{R}$. Is the following statement true? Why?

7	Prove the distributivity of sum of limits	$\lim_{n\to\infty}\left(x_n + y_n\right) = X + Y$
8	Prove the distributivity of scalar product of limits	$\lim_{n\to\infty}\left(\lambda x_n\right) = \lambda X$ where $\lambda \in \mathrm{R}$
9	Prove the distributivity of difference of limits	$\lim_{n\to\infty}\left(x_n - y_n\right) = X - Y$
10	Prove the distributivity of product of limits	$\lim_{n\to\infty}\left(x_n \cdot y_n\right) = X \cdot Y$
11	Prove the distributivity of quotient of limits	$\lim_{n\to\infty}\left(\frac{x_n}{y_n}\right) = \frac{X}{Y}$, where $Y \neq 0$

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End-of-Semester Objective Structured Clinical Examinations in Taylor's University School of Medicine: Review of Overall Reliability and the Domains Assessed

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Abstract Objective Structured Clinical Examination (OSCE) is often accepted as a reliable assessment tool for competency-based assessment in the clinical phase of medical programme. In Taylor's University School of Medicine, OSCE is the main assessment tool for end-of-semester (EOS) summative continuous examination in phase 2 clinical training. During OSCE, the candidates are required to go through a total of 16 stations with specific instructions given as to what they need to perform. The question can be about history taking from a patient, performing specific physical examination, interpreting test results, explaining results to patient, or providing education to patients. An examiner is placed in each station and assesses the candidate using a predetermined objective marking checklist. The candidate is given only 6 min to complete the required task. Being a new programme in this university, currently only two cohorts of students are in clinical phase since September 2012 who have completed semester 5, 6 and 7 EOS OSCEs. The objective of this paper is to answer two questions: (1) What is the overall reliability of EOS OSCEs in phase 2 clinical assessment? (2) Are the various domains in clinical training adequately assessed within these OSCE stations? The EOS 5, 6 and 7 OSCE results were tabulated using Excel spreadsheet, and the content of all questions are reviewed. SPSS v17 was used to generate the Cronbach alpha reliability. The results show that there was a fair distribution of the domains tested across all the postings in all the EOS assessments. History taking, physical examination, psychomotor skills in performing procedures, the ability to interpret test results and communication skills were all fairly equally distributed in all the EOSs. With a total of 16 stations, the reliability of OSCEs was between 0.6 and 0.7, which is considered as acceptable reliability. This is a preliminary survey on the quality of assessment in clinical school. Future

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research to determine minimum stations required to achieve a good reliability for OSCE is necessary for a better quality clinical assessment in phase 2 clinical training.

Keywords OSCE • Reliability • Clinical domains • Assessments

1 Introduction

Objective Structured Clinical Examination (OSCE) is an important assessment tool for clinical skills. It is often one of the main assessment components for clinical training in undergraduate medical programme (Davis 2003). OSCE has the strength in assessing wide domains in clinical learning, from history taking, physical examination, communication to ethics and professionalism. It is often accepted as a reliable assessment tool for competency-based assessment in the clinical phase of medical programme (Rethan et al. 2002).

In Taylor's University School of Medicine, OSCE is the main assessment tool for the end-of-semester (EOS) summative continuous examination in phase 2 clinical training. Being a new programme in this university, currently only two cohorts of students are in clinical phase since September 2012 who have completed semester 5, 6 and 7 EOS OSCEs.

During OSCE, the candidates are required to go through a total of 16 stations with specific instructions given as to what they need to perform. The station may be history taking from a patient, performing specific physical examination, interpreting test results, explaining results to patient or providing education to patient. An examiner is placed in each station and assesses the candidate using a predetermined objective marking check list. The candidate is given only 6 min to complete the required task.

OSCE is the main clinical assessment tool; therefore it is important to evaluate the overall reliability of all OSCEs that have been conducted over the past 2 years. The overall reliability represents an estimation of the correlation of scores of these assessments with scores on hypothetical assessments which are composed of the entire portfolio of problems (Brannick et al. 2011). This entire portfolio of problems is usually common encounters in real-life clinical practice.

The objective of this paper is to answer two research questions: (1) What is the overall reliability of EOS OSCEs in phase 2 clinical assessment? (2) Are the various domains in clinical training adequately assessed within these OSCE stations?

2 Methodology

This is a retrospective review of the EOS assessment in phase 2 clinical programme from semesters 5 to 7. This study was conducted from 1 to 14 May 2014 over a period of 2 weeks. All the OSCE scores (marks) were retrieved from the

academic records of the students in semesters 5, 6 and 7. The EOS 5, 6 and 7 OSCE papers were also retrieved from phase 2 clinical school academic office. Approval was obtained from the phase 2 programme director and the dean of the School of Medicine, Taylor's University. All the OSCE papers were reviewed by two researchers and the domains assessed in each OSCE question were identified. Among the domains which were commonly assessed in OSCE were history taking, physical examination, performing a procedure, interpretation of laboratory test results, recognizing common electrocardiographs (ECGs), interpreting radiographic images, identifying common medical instruments and drugs, counselling patients and communication skills. The OSCE domains were tabulated using Microsoft Excel spreadsheet, and the content of all questions is reviewed. SPSS version 17 was used to generate the Cronbach alpha reliability. Ethics of confidentiality and justice were highly adhered to as the results are only handled by the researchers and the findings of the analysis would not lead to any alteration of results.

3 Results

All the EOS assessments in phase 2 clinical training were integrated components from various postings. In EOS 5, the postings assessed were internal medicine, surgery, paediatrics and obstetrics and gynaecology; EOS 6 assessed on family medicine, emergency medicine, orthopaedics, otorhinolaryngology and psychiatry, while EOS 7 assessed on ophthalmology, anaesthesiology and critical care, internal medicine 2 and surgery 2. Community medicine, laboratory medicine and radiology were also integrated into these EOS assessment components. With a total of 16 stations, the reliability values of OSCE in semesters 5, 6 and 7 were 0.65, 0.72 and 0.61, respectively (Table 1). These values are considered as acceptable reliability. The distribution of the domains assessed in semester 5, 6 and 7 OSCEs is shown in Table 2. The results show that there was a fair distribution of the domains tested across all the postings in all the EOS assessments. History taking, physical examination, psychomotor skills in performing procedures, the ability to interpret test results and communication skills were all fairly equally distributed in all the EOSs.

Table 1 Cronbach alpha reliability of EOS 5, 6 and 7 OSCEs

Assessment	Total number of stations	Alpha value
EOS 5	16	0.65
EOS 6	16	0.72
EOS 7	16	0.61

Table 2 Domains assessed across different subjects in EOS 5, 6 and 7 OSCEs

Assessment	Subject	Domains assessed								Total
		History taking	Physical examination	Performing a procedure	Picture test	Lab results and ECG	Radiological imaging	Medical instruments and drugs	Patient counselling and communication	
EOS 5	Internal medicine 1	1	1			1	1			16
	Surgery 1			1	1	1	1			
	Paediatrics	1				1		1	1	
	Obstetrics and gynaecology	1	1					2		
EOS 6	Family medicine		1	1					1	16
	Emergency medicine			1		1		1		
	Psychiatry	2	1							
	Orthopaedics		1		1		1			
	ORL		1		1					
	Community medicine					1			1	
EOS 7	Internal medicine 2	1	1		2		2			16
	Surgery 2		1				2		1	
	Anaesthesiology					1		1		
	Ophthalmology				2					
	Lab medicine					2				

4 Discussion

The overall reliability of EOS OSCEs in phase 2 clinical training was above 0.6 which was acceptable. Majority of the published studies on OSCE showed reliability between 0.41 and 0.88 (Swanson and Norcini 1989). The reliability value can be improved further by increasing the number of questions in the assessment, but this will lead to increasing duration of the total assessment time. OSCE involved huge amount of manpower and preparation work; cost-effectiveness is another important factor to be considered. Although the reliability value that goes above 9.0 is considered excellent, there is a possibility of redundant testing on the same topics which does not bring any additional benefit. It will increase the cost of running unnecessary OSCE and also candidates' and examiners' fatigue (Barman 2005).

This study also demonstrated in end-of-semester 5, 6 and 7 OSCEs that all the necessary domains including knowledge, psychomotor skills and communication skills were adequately assessed. This is particularly important because our EOS is an integrated assessment of all clinical subjects; it is crucial to ascertain that the outcomes of all the domains were being assessed. These domains are the essential components of clinical training to ensure high competency of the students upon graduation as qualified and well-trained medical practitioners.

5 Conclusion and Recommendation

With a total of 16 OSCE stations in end-of-semester 5, 6 and 7 summative assessment in Taylor's University Clinical School, the OSCE assessment is reliable. All the essential domains of clinical training are adequately assessed. This is a preliminary survey on the quality of assessment in clinical school. Further detailed analysis including reliability within the stations and future research to determine minimum stations required to achieve a good reliability for OSCE is necessary for a better quality clinical assessment in phase 2 clinical training.

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Developing a New Method of Mobile Learning Among Distance Learners in a Public University

Yin Yin Khoo, Abdul Karim Noor Al-Huda, Taha Hafsah, Abdul Jalil Norasibah, and Adam Radziah

Abstract This study investigates the effect of mobile learning on distance learners' interest in the principles of economics. It also investigates distance learners' interest in mobile learning. In the study, interviews were carried out after intervention. Six distance learners from a public university were selected to participate in the interviews. The proposed methodology was used successfully among distance learners of the course of principles of economics. The findings revealed positive responses on distance learners' interest in the course and mobile learning.

Keywords Mobile learning • Distance learners • Interest • Principles of economics

1 Introduction

In recent years, distance education has been growing in Malaysia in line with the slogan of lifelong learning, as introduced by the country's leader. The distance learner has been strongly influenced by the wide-scale uptake of Internet-based learning approaches and an expanding distance education market (Koole et al. 2010). For those open and distance learning institutions with a large, well-resourced and sophisticated infrastructure, staff and student populations, it is possible to adapt and adopt the advancement of information technology (Danaher and Umar 2010). In reality, when distance learners are busy in working activities, it is difficult for them to carry their laptops every moment and interact with the lecturers. Therefore, the use of mobile or wireless devices is for the purpose of learning while the learners are not at fixed, predetermined location or when the learners 'take advantage of

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the learning opportunities offered by mobile technologies' (O'Malley et al. 2003). Based on this study, the purpose of mobile learning is more focused on the learning method that uses the latest technology such as the use of smartphones for delivering information to students. It shows that teaching can be implemented anywhere and at any time. Actually, mobile learning as an extension of the e-learning technologies that take into account an e-learning environment requirement should be implemented. This reformation in the technology has brought a big impact into our education system. It has prompted the creation of the new learning method that is closely related to the students' daily lives.

Almost every new intake of art students needs to take the principles of economics as a compulsory paper in Malaysia public university. The course of principles of economics consists of two components which are microeconomics and macroeconomics. Students who have the foundation subject in the secondary schools usually do not have problems mastering economic skills, whereas students who do not have it will face difficulties because the skills involve mathematics and graph elements (Andreopoulos and Panayides 2010). Many distance learners found that the subject of economics was difficult (Zakaria Kassim 1993) especially macroeconomics. This negative perception is one of the obstacles preventing distance learners from performing well in this subject. Distance learners who are taking the principles of economics in the semester need to plan a learning method to help them master the course besides enhancing their interests. In response to the challenge of the online learning environment in various innovative ways, this study was conducted to help distance learners enhance their mobile learning techniques. The main purpose of this study is to investigate the effect of mobile learning on distance learners' interest in the principles of economics. The study also investigates distance learners' interest in mobile learning.

2 Methodology

This study was employed by the mixed method explanatory design (quan+qual). Quantitative study was employed by the descriptive method followed by the interviews in the qualitative method. However, this paper only reported findings from the interviews. The sample was comprised of a purposive sample of six distance learners. They were first year students, major in economics at one of the public universities in Malaysia. The subjects were from education, government servant, private sector and self-employment. The distance learners vary from young adults (below 25 years old) to older adults (above 55 years old). Although gender was not a selection criterion for this study, it was noted that an equal portion of male and female subjects was selected. There were three female and three male distance learners. The purpose of the interview was to provide students an opportunity to express their experiences after the intervention. The rationale for selecting subjects from different age groups and different working environments was to get a representative spread of age and work experience.

A pilot interview with two interviewees from different public universities was conducted to allow the assessment of the reliability and validity of the interview protocol and the efficacy of the interview procedures (Eisenhardt 1989; Yin 2003). An interview protocol was developed to guide the follow-up interviews. All the subjects were contacted through email and telephone. The subjects were invited to participate in interviews ranged from 20 to 45 min in length. The interview questions were semi-structured and designed based on distance learners' learning interest after engaging with mobile learning. All the distance learners' answers were recorded on the interview protocol sheets. Subjects were prompted to further explain or classify responses to the interview questions until their responses were completed. The data were coded, indexed and analysed. From this process, two factors relating to mobile learning were explained in the findings.

2.1 Procedures

Lecturers' and distance learners' preparation for mobile learning should begin well before the implementation of the mobile learning. Preparation included managing distance learners' relevant skills and orienting students to the new learning environment.

The mobile software's framework was created by jQquery and jQquery Mobile. The database was built by mysq1, and the script language was written in PHP. The initial verification for mobile device had been done. The overview of the mobile learning with the icon ML is shown in Fig. 1. Figure 2 shows the login page.

Fig. 1 An overview of mobile learning

Fig. 2 Login page

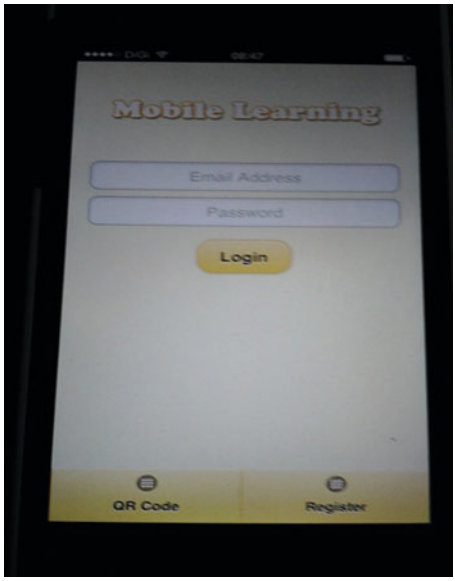

Fig. 3 QR code

A briefing was given during distance learners' intensive training at the end of January. Another section was also carried for facilitators. Handout and QR code (Fig. 3) card were distributed during the training session. Distance learners can go online by using the smartphone with the QR code to get the immediate access in the learning Web by scanning the code. Distance learners can log in with the QR code by downloading the QR reader. QR reader enables users to scan the code. Alternatively, they can scan the code online or using WeChat. This software is free of charge and user-friendly and can be logged in easily with the QR code. This software can be read only on mobile phones, not accessible through laptops. Specifically, it will encourage gadget-maniac students to read in mobile phones anywhere and anytime. At the same time, distance learners can also communicate with their lecturers and friends all the time. With the QR code students can scan learning materials and share their lessons in 'WeChat' or online.

Students will get the immediate notes upload for the three selected chapters (Fig. 4). The quiz was prepared for the distance learners to encourage active learning. The intervention took 8 weeks to complete.

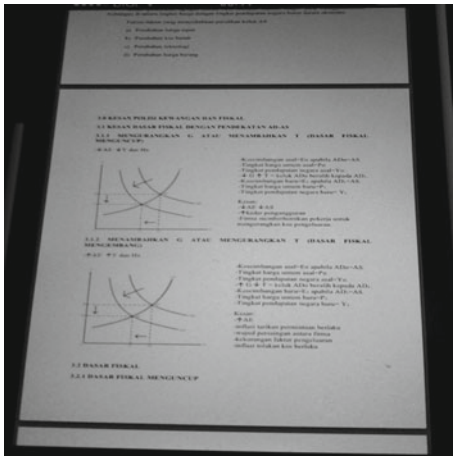

Fig. 4 Layout of notes in mobile phone

2.2 Mobile Software Functionality

The mobile software functionality is outlined in detail below:

2.2.1 Lecturer

- Respond to the comment
  The lecturer had the ability to answer the comment during the intervention. This is important because it provides the two-way communication between the lecturer and the students.
- Access to the quiz and questionnaire
  The lecturer had the ability to access to the quiz through the main system in order to get feedback from the questionnaire and be able to know the understanding of distance learners through quiz.

2.2.2 Distance Learners

- Register as user
  The distance learners were allowed to register and log in with their registered email addresses and passwords after registration.
- Post question and comment
  The distance learners were able to post questions and interact with the lecturer or their peers through the system. They could post the comments in the system.

3 Findings and Discussion

All the subjects had enrolled as distance learners for one semester. About 20 % of the subjects said that they never studied economics when they were in secondary school and they did not show any interest in this course. Half of the distance learners felt that economics was extremely hard, even though they had studied economics during their preuniversity level. The majority of the subjects did not experience mobile learning before. Subjects were asked to think and express their feelings after the intervention. A total of six subjects participated in the study; pseudonyms were used to safeguard their identities.

3.1 Interest in Learning Economics

Distance learners (subjects) agreed that after implementing the mobile learning, they could understand the economics concept easily. They enjoyed learning this course more than before, and they spent more time in this course because they could gain the knowledge within the fingertips. The following three comments were typically across the six distance learners:

B1: '*It is very flexible compared with learning with PC or in portal; I can learn anywhere because it is easy to carry. I even can lie on the bed and learn. We can bring the mobile with us even during working, and I can browse through the notes during my lunch break. I really enjoy to read with mobile phone*'.
G1: '……*I like this course than before*…….'
B3: '*It is easy to do revision wherever I am. It really helps and I can fully use my free time, especially adult learners like me and I read more than before*'.

Tan and Liu (2004) and Attewell (2005) shared the same views that most of the students showed interest in the subject after using mobile to learn because it is easy to use. The proper learning method can always enhance learners' learning interest towards the course. As adult learners who engaged with their own work, they would feel flexible to learn anywhere they liked and found it flexible to use. As the data showed, mobility was one of the main factors that attracted distance learners to use mobile learning. On the other hand, by using mobile learning, the distance learners' interest towards the course of principles of economics also increased.

3.2 Interest in Mobile Learning

In addition, this device is user-friendly, and the different types of mobile devices also can log in easily with the QR code. Analysis across distance learners' responses revealed that all of them would like to log in with QR code, even though it was only the first trial for some of the distance learners. They found log in with QR code was easier than the normal log in. B2 also stressed that with the QR code, they were able

to scan in 'WeChat' and discuss with friends after reading the mobile online notes. Their conversation expressed:

G2: '*This is my first time to use QR code but I feel good and like to use it*'.
G3: '*Mobile learning really helps, for the concept that I could not understand, I could ask my friends or lecturer immediately*'.

Compared with traditional instruction or information from textbooks, mobile learning seems to be a more attractive way of learning that can enhance the interest of learners (Hwang and Chang 2011). Serin (2012) postulated that most of the participants were interested in mobile learning environments and wanted to engage in mobile learning again if they had opportunities. The learning environment is competent with information technologies that forces distance learners to adapt to a rapidly changing environment. The mobile learning is user-friendly, flexible, accessible and student-centred and meets the needs of the distance learners. The distance learners may find that mobile learning is useful because efficient learning is the key for them to pass examination, and there is flexibility to learn at anytime and anyplace.

4 Conclusion

As a conclusion, the usage of mobile device had been tested among the distance learners. Based on the findings, it proves that this mobile learning supports different types of mobile devices. Therefore, researchers believe that mobile learning has an impact on teaching, learning and connections between formal and informal learning when learners are not in a fixed location (O'Malley et al. 2003) such as distance learning. Lastly the positive findings support continuation of future study, for example, mobile learning can be applied in universities or colleges not only in economics but also in other courses.

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The Importance and Implementation of Technology for Diploma Accounting Students at the University of Johannesburg

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Abstract The curriculum for accounting students is evolving to meet advancement in computer technology. To keep up with current concepts, the curriculum needs to have more depth with specific reference to technology, to facilitate the learning and development of students. This study aimed to explore how the implementation of technology can assist in assessing the students doing the diploma course in accounting. Secondary research methods such as books, peer-reviewed journals, magazines, newspapers and Internet resources were used to collect data and establish how technological advancement facilitates all features of professional accounting, thereby adding to the success of an organisation. Limited research on the use of technology in accounting warrants universities in South Africa to rethink the traditional learning model. The teaching of accounting has shifted from being teacher-centred to student-centred; the technological change in the teaching of accounting has also changed the culture of educational institutions. Students are being assessed on their theoretical as well as on their practical knowledge. For example, both the theoretical and practical knowledge of students are evaluated by requiring them to process transactions in a fictitious firm that they create. Students are also required to create a business plan and use software such as Microsoft Excel and Sage Pastel. While the study was based in South Africa, the findings of the study and the use of technology in accounting education could be utilised globally.

Keywords Accounting education • Computer technology • Teaching and learning • Student assessment

1 Introduction

The accounting profession has changed rapidly over the past 50 years. These changes made it imperative for educational institutions to focus on developing various methods to meet the high standards posed by this growing field. As a result, the

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functions of accounting that are used by the different institutions have become increasingly complex.

The advancement in technology has successfully enhanced all the demands of professional accounting, and educational programmes are challenged to equip graduates to meet the demands of the profession, thereby affording them the opportunity to find employment in both public and private accounting firms. Various institutions have also endeavoured to include different software packages into their curriculum to assess the students (Martinez et al. 2012).

Technology can no longer be ignored at this point in time of our lives. Truly, technology is and has been incorporated into and has shaped our society. Technology affects numerous components and institutions of the society including education. Thereby, accounting education is neither exempt nor immune to its effects. Integration and inclusion of technology to accounting education facilitates learning within the accounting learners rather than hindering it (Iniesta-Bonillo et al. 2013).

However, inclusion and integration of technology into accounting education has faced several challenges from the people involved in it to the institutions that comprise such a sector of education. Most of the write-ups and research have been focused on the teacher who needs to have and/or be equipped with knowledge in technology as well as the acceptance and readiness of the accounting students towards technology integration as well as on the digital division that technology might do to the society. However, all of such challenges have been answered already or continuously answered wherein most scholars agreed that technology does have more beneficial effects than bad ones. Seldom focused on the curriculum development of the accounting education, it is one of the vital factors to which the teachers and accounting students have and are basing their pedagogies and learning (Kinyondo et al. 2012).

This paper discusses how technology can be incorporated into the accounting curricula of educational institutions, and emphasis is placed on how various institutions have implemented technology in the assessment of students. Recommendations are made on how the University of Johannesburg can implement accounting software packages and technology to assess the students at that university.

2 Problem Statement

Learners in the diploma accounting programme have a lack of ability to integrate technology and accounting theory, and as a result, this impacts their ability to perform successfully in the workplace.

3 Research Objectives

The aim of the study is to establish a comparative study to determine the impact made on the accountancy professional. The intention is to determine whether the changes made in accounting institutions are adopted and learned by the students and to recommend that technology be used by accounting students at the University of Johannesburg. The study was based on the past and the present data of other universities, how technology was implemented by university students, and how technology was used to assess the students.

4 Research Questions

The study designed the following research questions:

- How does the computer technology affect the accounting curriculum in the University of Johannesburg?
- How does the performance of the students improve with the use of computer technology?
- What are the benefits of implementing various software packages and technology regarding assessment?

5 Methodology

The research was based on secondary data collection. The data was extracted from various journals, articles and books. Secondary research described information gathered through literature, publications, broadcast media and other non-human sources.

The qualitative research method was used. Qualitative research is more subjective than quantitative research and uses different methods to collect information which could be both primary and secondary. As already mentioned, this study chose the secondary method.

This type of research is often less costly than surveys and is extremely effective in acquiring information. It is often the method of choice in instances where quantitative measurement is not required.

The author used a deductive approach of logic and gathered data that contained general information on the topic. Through this information, the author identified specific themes of the study.

6 Findings

6.1 Use of Technology in Education

In the past, technology was used to deliver direct instructions such as instructional television and interactive radio, especially in low-income countries, and audio tapes and photocopying machines were the main aids to learning (Kinyondo et al. 2012). Today, education has expanded to include the Internet, email and the World Wide Web. Many educators are at a distinct disadvantage, as many students are more adept at using computers than they are. This situation does not only embarrass the educator but also makes teaching less effective (Sánchez et al. 2013, p. 163).

6.2 Role of Technology in Education

Technology encompasses the whole architecture of modern education, and accounting is no exception. For instance, social media and distance learning not only make it easier for students to study and learn accountancy, the online lecture and practical application of the theory make it easier for the educator to teach and assess the students. In addition, the use of software such as Peachtree, QuickBooks, SPSS and Microsoft Excel enables students to learn different time-saving and labour-saving techniques. The shift from teacher-centred to student-centred learning has also revolutionised the way accounting is taught at all levels (Groot et al. 2013, p. 1286). Before computers were plentiful, projectors and PowerPoint presentations were used in class, and accounting transactions were recorded manually in business institutions (Czerniewicz and Brown 2013, p. 44).

7 Literature Review

7.1 Circumstances of South Africa

Two studies were conducted recently on using technology to teach accountancy, one in Spanish literature (Sanchez and Mateos 2010) and one in British literature (Basioudis and de Lange 2009), but to date, no research has been done on the subject in South Africa.

The interchange of ideas, products, etc., has led to economic and societal drivers such as globalisation, societal change, technological advances and international integration (Newby et al. 2011). These changes have forced universities throughout the world, including South Africa, to rethink the model of traditional learning. The advance in technology, in particular, has not only changed the teaching of accounting

but has also changed the culture of educational institutions. Social media plays a significant role in learning and teaching as well.

Accounting teachers need to be flexible; they have no choice but to welcome technology into their classrooms and to equip themselves to provide their students with the knowledge they need in the field of accounting (Sánchez-Correa et al. 2014, p. 75). However, while technology and social media serve a variety of roles in education, their primary role is to enable the students to learn. Therefore, educators need to be selective in their choice of technology.

The department of commercial accounting at the University of Johannesburg is among the first internationally to provide courses that integrate the theory of accounting with software packages that are commonly used in business, including credit and banking programmes for management. Graduates are equipped to eventually use the software at their place of work while applying their knowledge of accounting (Bélanger et al. 2013, p. 20).

Since 2011, the accounting course at the University of Johannesburg has combined the theoretical with practical application using accounting packages such as Sage Pastel Evolution. The students create a fictitious company and then apply the theory that they learn to manage their company throughout the semester. In other words, the topic covered in the lecture on accounting theory is applied practically.

At first, the students found it difficult to answer questions on the integration of theory with the practical and they tended to isolate the two. This was overcome by asking the students to first record transactions manually before capturing them on the system.

The fictitious firm that the students create is an imitation of a real firm, and the transactions are similar to what they will encounter in a real firm. They record the initial transactions from the source documents right through to the analysis and final preparation and interpretation of the statements (Lundgren and Robertson 2013, p. 1406). The students therefore are able to understand what running a business entails and are made ready to work in an organisation.

7.2 Technology and Assessment

Technology and social media were used not only to teach the students but also to assess them. Students are assessed on two levels. They are required to submit two portfolios including printouts of the documents and transactions that they processed during the classes on practical accounting. From this, the educator is able to assess whether the students can process transactions based on the theory they have learned. The fruits of this programme will be seen next year when the first batch of students graduate and enter the workplace.

The traditional way of assessment was based on two tests and an examination; different questions assessed the ability of the student to record transactions manually and on how they integrated these transactions with Pastel software. The students

were usually given snapshots of Pastel transactions and documents, and questions were based on the snapshots.

The challenges faced by the accounting department at the University of Johannesburg were similar to those faced by most educational institutions, i.e. students who did not attend the practical accounting classes. As mentioned previously, it was important for students to attend both the practical and the theoretical classes so that they could understand and integrate the accounting theory with technology.

It is evident that the students who are exposed to the current accounting educational programme are better prepared for the workplace than those who were not exposed to the programme. Students who fare better in accounting theory should be motivated to raise their knowledge of technology to the same level. Educators must also keep up with the times and be creative in the use of available technological resources to enhance learning. There is an explicit need to integrate all modes of technology and social media into the environment of learning.

7.3 Integrating Accounting Curriculum

Hejazi et al. (2003) introduced an integrated accounting curriculum in SAP accounting software and included the Enterprise Resource Planning (ERP) software package. SAP is the global leader in ERP software. Almost 2,000 businesses and educational institutions use SAP to manage and meet their need for information. The key feature of SAP's R/3 software is its richness in configuring the system for the extensive modification of programmes. The SAP is used by all the application modules. SAP has been implemented in the course on management information systems. SAP can also be used in different other courses such as operation management, which requires a junior level course. It also teaches students how resources can be planned and organised together with the strategies of organisations (Grandzol et al. 2010).

7.4 Software Packages

Information management includes marketing, sales production, logistic accounting and finance. ERP is also used to manage quality assurance and management. In finance, students are taught capital budgeting, time value of money and the relationship between risk and return. By using SAP, students have a better knowledge of quality management and can assess the feasibility of a project. It can also be used in marketing management and human resource administration.

In marketing, SAP can improve the decision-making skills of the students based on the sales and revenue data. The marketing and sales report can also enable students to declare relevant information about the customers, such as their addresses, names and the annual sales. Human resource students can also focus on

administration, planning, recruitments, selection and compensation. R/3 initiatives have made improvements in the three programmes regarding technical support, continued training of the technical support personnel and continued training.

Accounting professionals have to perform various tasks such as costing, recording, budgeting and financing. To meet these demands, the quality of education must be raised. According to Ainsworth (2001, pp. 279–297), to satisfy the needs of the accounting profession, accounting teaching techniques have changed considerably over the past few years. According to the following standards must be met:

- Accuracy
- Fitness of purpose
- The goals of the organisation
- The direct and indirect needs of the customer

In the past, accountants were required to only do bookkeeping, but today they must be able to also do the costing of the product, auditing, taxation, etc. (Martinez et al. 2012, p. 7303).

Integrating XBRL into the accounting curriculum is important. XBRL is an extensible business reporting language required by 500 of the largest companies for security and exchange commission filings and federal deposit institutions. As accounting is a business language, it is used to disseminate and report construction. XBRL is basically an interactive reporting language. Previously, the business reports had only the basic components of the vernacular.

Today's fast-paced and technology-driven world with its demands for expediency prompts accounting professionals to place a premium on information which is easy to find. As XBRL is proficient in streamlining financial reports, it should be taught to students so help them understand financial reporting.

According to Saudagaran (1996), there is an increasing demand for highly qualified accountants because of the improvements in accounting education and the use of technology. Carl and Desmore (1988) find video conferencing effective in teaching accounting from a studio to distance students. The students are connected to the class via the Internet or telephone. Interactive television can also be used to teach accounting.

Little research has been done on how accounting students feel about distance learning and tele-teaching. However, Seay and Milkman (1994) studied the performance of accounting students at junior level and their reaction to two-way Internet technology (IT). According to this study, students at the remote site outperformed students at the originating site. While the students at the remote site could not enrol in the IT course, they could choose traditional instruction.

During the second semester of 1996, accounting lecturers at Monash University used a camera and a microphone to manage and maintain eye contact with students between the Gippsland and Berwick campuses. The lectures proceeded smoothly, but problems such as connection, time delay for material transmission and interaction with the students were experienced. Tele-teaching by a team of accountants was again introduced in 1999 based on 1.5 h, thus avoiding start-up time. Communication between the students and educators was encouraged by different immediate

questions. The settings of the microphones and camera allowed the staff to focus on the students who asked the question and transmit their image and sound to other sites. The video and audio quality has improved to where there is no time delay. According to Freeman and Tenant (1998), the evaluations were also used for developing tele-teaching in the year 1999. Benefits included greater equality assessment and learning and increased interaction between the campuses. Disadvantage included reduction in access to the lectures and the potential for increased unruly behaviour. Tennant (1998) also found that students at remote sites could be included in the lectures and that they experienced a reduced span of concentration.

The introduction to accounting, learning objectives and complexity of content is similar all over the world. A similar procedure for selecting the course as in the past year was followed so there was a similar group as far as features and characteristics were concerned. The lecturers for the sessions remained the same as the previous tele-teaching programme; therefore, the variables were constant except for the improved tele-teaching skills and better technology (Lundgren and Robertson 2013, p. 1406).

Quantitative and qualitative procedures were used to seek information from the students. Students provided responses regarding tele-teaching based on the different questions asked. From the findings, it was concluded that the staff required more remote sites, students were treated equally, tele-teaching was a fair technique that avoided lectures being repeated and tele-teaching allowed students to learn efficiently and provided interaction with the lecturers.

According to Chalmers and Wright (2011), professional accountants generally have poor communication skills but are able to provide appropriate quantitative outcomes for an organisation. Research is needed on how to best develop accountancy to improve the performance of firms. There are three major components for the profession of accounting, i.e. practice, research and policy. Education based on these accounting components can meet the requirements of South African organisations and institutions and its economy.

Currently, most South African institutions use different information technologies successfully to resolve their problems. Accountants are more capable than in the past to present appropriate accounting to external auditors.

8 Conclusion

While several studies have been done on incorporating technology in education and using technology to assess students generally, no research has been done in accounting in South Africa.

The advancement of technology has had a great impact on the field of accounting and had enabled accountants to contribute to the success of organisations. Universities throughout the world, including those in South Africa, have been forced to rethink the traditional teaching and learning model. Almost everywhere in

the world, calculators, computers, Microsoft PowerPoint, projectors and Microsoft Excel are used as teaching and learning tools and time-saving devices for students as well as educators. Students are also taught online via distance education, and, unlike face-to-face classes, students can review the lectures again and again.

Educational strategy based on newer technology has incorporated the Internet and the World Wide Web to expand communication, have access to lecturers and students and increase resources. These changes in technology have changed the role of the educator. Technologies such as XBRL, SAP and SPSS save time and ultimately increase the efficiency of the students. To answer questions from the students, educators should fully equip themselves not only with accounting knowledge but also in the use of technology, because students are generally more adept at using computers and technology than the educators.

This paper briefly discussed the changes made in the field of accounting over the past few years and how these e-changes affect students of accounting. The paper also briefly discussed changes made in the field of accounting and the various ways in which technology can be adopted into the assessment of students.

South African universities, including the University of Johannesburg, should use technology to assess accounting students and should implement software such as SPSS, Microsoft Excel and Microsoft PowerPoint to enable the practical application of accounting theory. Developing business plans also allows students to establish what cost is incurred to start up a new business and how the business can be financed, i.e. it gives the students practical experience for starting up a new business. It is necessary for the students to manually record transactions before capturing them onto the system using various software.

9 Recommendations

The University of Johannesburg should implement e-marking to assess students of accounting. By using e-marking, secrecy and transparency can be maintained. This process first scans examination booklets electronically before splitting electronic copies into components, items and sub-questions (Calero and de Huelva 2011). With the introduction of e-marking, reliability and integrity will be maintained. Impersonation and cheating will be counteracted. Marker error will be reduced to less than 2 %. Students will meet the various challenges and deadlines for university admission. The university will be empowered to improve the practices of teaching and the outcomes of learning. Students can be given various tasks to cover what was discussed in class to build their practical knowledge and perform well in the working environment (Calero and de Huelva 2011).

The students must become familiar with accounting software so that their theoretical as well as their practical knowledge can be improved. The University of Johannesburg should also familiarise the students with the features of Moodle software, as it will

- Provide options for assessing learning materials and assessment scores
- Provide facilities for assignment submission, a discussion forum, grading, file downloading, online calendar, online announcements and news, and online quizzes
- Allow students to assess the results themselves

Moodle's modular construction supports different plug-ins such as resource types, activities, content filters, question types, graphical themes, enrolment methods, authentication methods and types of data.

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CDIO Attainment for Taylor's Undergraduate Chemical Engineering Programme

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Abstract A new strategy for engineering education has been developing since the early 1960s as a reaction to the new era after the World War II. By the 1980s, the new educational system has evolved with a strong emphasis on technical fundamentals. Accordingly, a list of new Learning Outcomes became the cornerstone as a result of many years of surveying, considering, and modifying the old engineering educational system. Conceive, Design, Implement, and Operate (abbreviated as CDIO) constitute the fundamentals and the cornerstone of the new system. These CDIO initiatives are not merely concepts but also are a measurable concept. Throughout this paper, a new stratum of mapping will be added in addition to the current mapping implemented in the School of Engineering at Taylor's University. Currently, for graduate students, there are Programme Outcomes (POs) and Learning Outcomes (LOs) – both are mapped to each other. In order to make quantitative results, these mapping are measured using the School of Engineering software, End-of-Semester Assessment Tool (ESAT), which is developed and implemented locally. The results show that the LOs' and POs' attainment for each module could help in providing new or modified strategy only to improve a specific module. CDIO initiatives go beyond that to show the area of growth in what field (C, D, I, or O) rather than a specific module in this first 2 years. Involving quantitative assessment of CDIO in the early stage of engineering education will absolutely shed the light to provide opportunity to close the loop of gaps available, not the module but the whole system.

Keywords Chemical Engineering • CDIO • Learning Outcomes • Programme Outcomes

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1 Introduction

Building skills is one of the fundamental bases of each educational institute. It is true that education has rooted itself in the human history, but it is until recently it has started to shape itself under new philosophy. Educational institutions are indifferent from other aspects of the social life in the sense of developing themselves. Engineering educational process has its own challenges which, to a certain extent, are different from other educational fields. In the 1950s, or even before this time in some countries, the engineering educational system depends entirely on faculty of distinguished practitioners of engineering, which means that the engineering education was based on practice. In the late 1950s, after the end of World War II, the engineering educational system has started a new era as universities started hiring young engineering scientists (CDIO 2014). The period of 1960s could be called the golden era in which the new fashioned education was mixed with the older practice-based faculty. The new educational systems acquired another depth as the oldest practitioners retired in the 1970s and were replaced by engineering scientists. The change was to provide the engineering students with more scientific foundation and equip them with the ability to endeavour the unknown future technical challenges. Thus, the shift in the culture of engineering education became a reality, and many of the key skills and attitudes that hallmarked the engineering education have been diminished. The industry, as a result, started in the 1980s to recognise the importance of the change in the knowledge, skills, and attitudes that are needed for graduating students.

The developments of the new engineering system require a clear vision for a comprehensive understanding of what is needed for new engineers. The new vision was accomplished by utilising the stakeholder focus groups of engineering faculty, students, and industry representatives. The "full set of knowledge, skills, and attitudes that engineering students should possess as they leave university" was the concern of the focus groups. A list of learning outcomes expectations by the focus groups, industry, government, and academia was formulated and called the CDIO Syllabus (Conceive, Design, Implement, and Operate) (CDIO 2014; CDIO Website 2014). Briefly, CDIO is a system which has no specific course to be taught but rather a new philosophy of learning experiences reviving the real life of engineers (Gunnarson 2007).

The new system, CDIO, was implanted physically in MIT by modifying the course work and the method of teaching. The curricula were modified to serve project-based education, and the interdisciplinary nature of engineering has to be aligned with the content of the courses. It is the first time MIT engineering students worked in teams to design, build, and operate product systems. CDIO system was not designed for a specific country, institution, or purpose; it is rather an open system which is still developing in order to satisfy all challenges engineering is facing (Gunnarson 2007). The whole process was summarised by Dr. Charles Vest, the president of the US National Academy of Engineering (NAF), saying: "We need to rethink engineering education and find a new balance" (Crawley et al. 2007).

The new balance, for instance, comes simply with the CDIO initiative as CDIO prepares engineers within three dimensions: equipped with skill, fortified with better education, and satisfies the need of the industry (Auyang 2004). Currently, Malaysian engineers are excellent in the "hard" skills but lack "soft" skills or the ability to communicate and make presentations (Tan 2013). Dr. John Turtell, Manager of ExxonMobil Business Support Centre Malaysia Sdn. Bhd., claimed that leadership, communication skills, analytical capability, honesty, and integrity are main qualities MNCs like ExxonMobil is looking for in fresh graduates (Dominic 2013).

CDIO, as we have seen, is improving and developing. The cornerstone for CDIO's success is performed by measuring (gauging) the success. The assessment includes: How deep is the students' understanding of engineering discipline? How much knowledge and skills do engineering graduates develop during their practice? What is the importance of applying CDIO as educational tool to stakeholders? How deep instructors are changing their assessment methods? How is enrolment changing as a result of implementing CDIO especially for female students? How is strong evidence employed to improve the CDIO programmes (Vincenti 1990)?

CDIO, as a philosophy, has its own standards of 12 operational steps. In this paper, the authors intend to standardise the educational process in the Chemical Engineering programme to evaluate the closeness of this programme to the 12 standard points. The 12 points are the context, learning outcome, integrated curriculum, introduction to engineering, design-implement experience, engineering workplace, integrated learning experience, active learning, enhancing the faculty skill, enhancing the faculty teaching, learning assessment, and programme evaluation (Crawley et al. 2007). This initiative integrated learning across multiple experiences. For instance, a project-based learning (PBL) pedagogy or a CDIO approach is better? Edström and Kolmos (2012) reported that both engineering approaches complimented each other very well. It shall be combined as this pedagogy will help to implement appropriate learning experiences. However, Karpe et al. (2011) claimed that teaching and learning incorporated with CDIO framework demand heavier learner engagement compared to the conventional pedagogy method.

Curriculum revamp using the CDIO framework made Chemical Engineering education more interesting (Jessy and Cheah 2012). Several researches have been conducted to incorporate CDIO frameworks into Chemical Engineering curriculum. Vigilid et al. (2007) adopted the CDIO standards and syllabus to a Chemistry and Biotechnology Engineering programme, and von Solms et al. (2010) introduced the context of CDIO and CDIO standards in the Chemical Engineering Capstone project. Later, Karpe et al. (2011) found that this initiative is productive and enables academician to develop a coherent framework to address graduate capabilities. However, there is no quantitative assessment to measure the CDIO attainment of students in Chemical Engineering programme at the early stage.

Briefly, this study has two parts: first, standardising the teaching process in the Chemical Engineering programme and second, making assessment to measure the success of employing CDIO and how the programme applies the educational process for the first 2 years of experience at Taylor's University for Continuous Quality Improvement (CQI) purposes.

2 Methodology

The foundations of CDIO as Conceive, Design, Implement, and Operate will be measured based on the Learning Outcome of four chosen modules by using ESAT where LO's and POs' attainment were analysed (Gamboa et al. 2013; Gamboa and Namasivayam 2013).

2.1 Selected Modules

For the 2 years experience, four modules were chosen as follows: Engineering Design and Communication (Semester 1/Year 1) (ENG1513), Engineering Design and Ergonomics (Semester 2/Year 1) (ENG1533), Multidisciplinary Engineering Design (Semester 3/Year2) (ENG2513), and Engineering Design and Innovations (Semester 4/Year 2) (ENG2523). The modules sequentially chosen as most same students were followed in their education for four successive modules. The second reason for choosing these modules is the similarity or the closeness of these modules. This closeness adds difficulty in assessing and analysing the outcome. However, as we will that by introducing CDIO as a new indicator, the difficulty will be evaded. For each of these modules, there is a set of three LOs. The comprehensive topics for each module are mapped to the set of LOs, while each LO is mapped to at least one Programme Outcome (PO). The sequence of mapping helps in measuring the attainment of each LO or PO. In this study, another level of mapping has been added as each LO is mapped to one of the four pillars of the CDIO. Thus, there strata of mapping will constitute this study.

2.2 Adopted LOs

Traditionally, the Learning Outcomes (LO's) are adopted by educational institutions to explain the level of knowledge given to the students. The Learning Outcome of each of the previously mentioned modules are shown in Tables 1, 2, 3, and 4.

Table 1 Learning Outcomes of Engineering Design and Communication mapped to CDIO

Learning Outcomes (LOs)	CDIO mapping
LO1. Produce useful ideas and concepts using brainstorming	C
LO2. Design a system that solves a complex engineering challenge using the design process	D
LO3. Conclude findings from working in a team through technical documentation	I and O

Table 2 Learning Outcomes of Engineering Design and Ergonomics mapped to CDIO

Learning Outcomes (LOs)	CDIO mapping
LO1: Produce useful ideas and concepts using cognitive ergonomics	C
LO2: Design a system that solves a complex engineering challenge with an emphasis on human factors	D
LO3: Evaluate the occupational health and safety of an engineering system as well as its success in being sustainable	I and O

Table 3 Learning Outcomes of Multidisciplinary Engineering Design mapped to CDIO

Learning Outcomes (LOs)	CDIO mapping
LO1. Apply techniques, such as trimming, random entry, and systems thinking to conceive, design, implement and operate a system which solves a complex engineering challenge	CDIO
LO2. Evaluate the manufacturability (in terms of production effectiveness) and sustainability of an engineering system	I and O
LO3. Explain the role of ethics in engineering design	CDIO

Table 4 Learning Outcomes of Engineering Design and Innovation mapped to CDIO

Learning Outcomes (LOs)	CDIO mapping
LO1. Identify a complex engineering challenge that has business value	C
LO2. Design a system, with the aid of design tools and techniques, which solves a complex engineering challenge that has business value	D
LO3. Explain the importance of IP rights as a legal instrument for commercial monopoly (IO)	I and O

2.3 Program Outcomes

Based on the CDIO initiatives, the Chemical Engineering programme (CE) at Taylor's University developed a set of 12 requirements that satisfy the need of the industry, the ambition of the stakeholders, the educators' perspectives, the CDIO initiatives' requirements, and the far objectives of the programme itself. Programme Outcomes of Chemical Engineering programme is shown in Table 5. Each module, core or elective, is mapped to at least one or more LOs. The 12-outcome goals are in agreement with the Engineering Accreditation Council (EAC) requirements (Namasivayam et al. 2013).

3 Results

Mapping is the first critical step towards assessing the CDIO initiatives. Firstly, the assessment for each module is categorised and mapped to their relevant Learning Outcomes (LOs). The second mapping process is to map those LOs to their relevant

Table 5 Programme Outcomes (Chemical Engineering)

PO1	Apply the knowledge of mathematics, science, engineering practices, innovation techniques, entrepreneurship, and human factors to provide value-adding solutions to complex Chemical Engineering challenges
PO2	Identify, formulate, analyse, and document complex engineering challenges to arrive at viable solutions and substantiated conclusions
PO3	Conceive, Design, Implement, and Operate solutions for complex engineering challenges that meet specified requirements with appropriate consideration for public health and safety and cultural, societal, environmental, and economical considerations
PO4	Conduct research and investigation into complex challenges using methods which include experiment design, analysis of data, and synthesis of information to provide valid conclusions
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an awareness of the accompanying assumptions and limitations
PO6	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal, economical, and cultural issues and the consequent responsibilities relevant to professional engineering practice
PO7	Explain the global impact of professional engineering solutions in societal, economical, and environmental contexts and demonstrate knowledge of and need for sustainable development
PO8	Apply professional and ethical responsibilities of engineering practice
PO9	Effectively communicate complex engineering activities, both orally and in a written form, in both technical and non-technical contexts
PO10	Function effectively as an individual and in multidisciplinary settings with the capacity to be a leader
PO11	Recognise the importance of lifelong learning and engaging in continuous professional development activities in accordance with technological change
PO12	Effectively manage projects in multidisciplinary environments and apply project management tools and techniques to one's own work as a member and leader in a team to satisfy stakeholders requirements

Program Outcomes (POs) (Gamboa et al. 2013; Gamboa and Namasivayam 2013). The third level is to map the LOs to their relevant Conceive, Design, Implement, and Operate (CDIO) initiatives. By employing this set of mapping, LOs, POs, and CDIO initiatives are inter-mapping with each other – the step that enables us to assess or measure each of them.

Tables 1, 2, 3, and 4 contain the required assessment and the mapping for the four modules under consideration. Part one of the tables explains the assessment of each module and the percentage weight of each assessment. These assessments are mapped to their relevant LOs. It is clear that the total marks given to each module, (100 %), is distributed amongst the three adopted LOs by the School of Engineering. Part two of the tables shows the three LOs and their attainment (see Fig. 1 achieved by all active students enrolled in each module). The attainments listed in part two were calculated by a software, developed and enhanced by the School of Engineering – ESAT (the End-of-Semester Assessment Tool) (Gamboa et al. 2013; Gamboa and Namasivayam 2013). The procedure used in this software depends on three factors: mapping as shown in the Tables, the achievement of the students, and the normalisation.

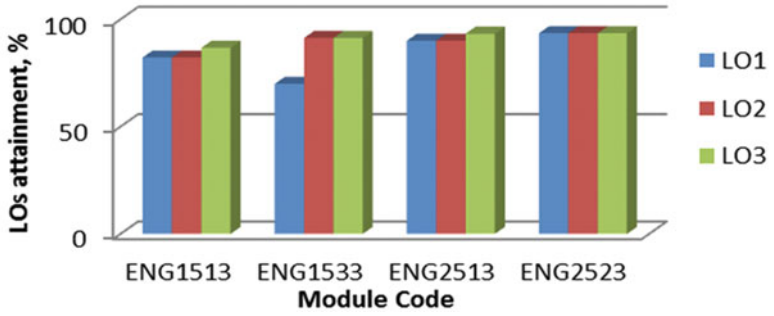

Fig. 1 LOs' attainment

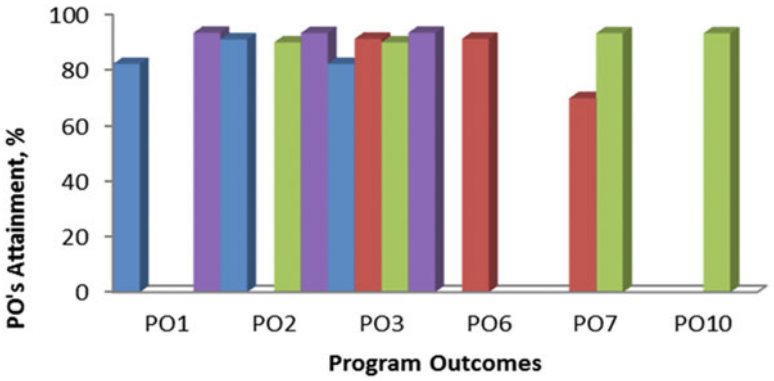

Fig. 2 POs' attainment

LOs are crafted based on POs. Referring to Table 5, only six Program Outcomes are used to craft LOs for these four design modules. The six Programme Outcomes are PO1, PO2, PO3, PO6, PO7, and PO10. The mapping of these modules to these POs was implemented by the School of Engineering as a result of the cooperation with the stakeholders, the need of the industry, and the EAC requirements. ESAT, again, was used to count for the attainment of each PO as shown in Fig. 2. In this study, each of the four initiatives, CDIO, is mapped to relevant LOs. The attainment is calculated using the mapping procedure and LOs' attainment. The CDIO's attainments are shown in Fig. 3.

4 Discussion

In the following analyses, two types of average and standard deviations for LO, PO, and CDIO attainments were adopted. The average and standard deviations represent the achievement of each LO, PO, or CDIO initiatives of the course of study for four semesters or 2 years and can be seen in Tables 6, 7, and 8.

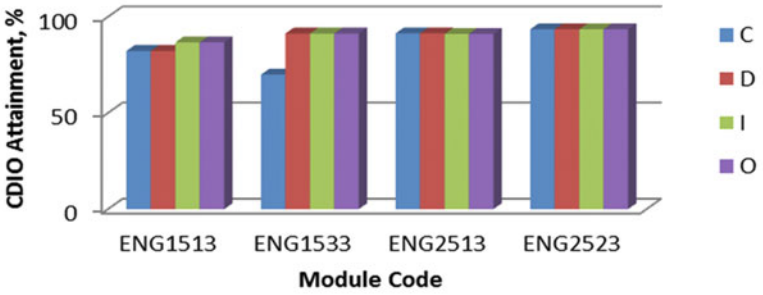

Fig. 3 CDIOs' attainment

Table 6 LOs analysis

	ENG1513	ENG1533	ENG2513	ENG2523	AVG	STD
LO1	82.2	69.9	90	93.5	83.9	10
LO2	82.2	91.3	90	93.5	89.3	4.9
LO3	86.7	91.3	93.3	93.5	92.3	1.3
AVG	85.2	84	91	93.5		
STD	5.14	12	1.9	0		

Table 7 POs analysis

	ENG1513	ENG1533	ENG2513	ENG2523	AVG	STD
PO1	82.2			93.5	88	8.3
PO2	91.1		90	93.4	92	2.1
PO3	82.2	91.3	90	93.5	89	4.9
PO6		91.3			91.3	0
PO7		69.9	93.3		82	16.5
PO10			93.3		93.3	0
AVG	85	84.2	92	94		
STD	5.1	12.4	1.7	0		

Table 8 CDIOs analysis

	ENG1513	ENG1533	ENG2513	ENG2523	AVG	STD
C	82.2	69.9	91.4	93.5	84.3	10.8
D	82.2	91.3	91.4	93.5	89.6	5
I	86.7	91.3	91.1	93.5	90.7	2.8
O	86.7	91.3	91.1	93.5	90.7	2.8
AVG	84	86	91.3	93.5		
STD	2.6	11	0.2	0		

The average of LO attainment (Table 6) for the four modules shows that the average of the higher modules ENG2523 and ENG2533 [(91 %) and (94 %)] is slightly higher than the low modules ENG1513 and ENG1533 (85.2 % and 84 %, respectively). One possible reason for this behaviour is because the students' understanding of the modules becomes better as they continue their education. The relevant standard deviation shows for all modules except for ENG1533 (Engineering Design and Ergonomic). For this particular module, the assessment for LO1 has only three contributions (see Part One in Table 1), while all other modules had their LO1 assigned for four contributions. When the LOs were taken to assess a student over the entire four semesters, the average also increases from 83.9 to 92.3. The two results are in agreement. The results are clearly promising as the concept of the design becomes easy for students to utilise, which suggests that students are developing during the course of the study. The relevant standard deviation results show that LO1 over 2 years has much higher standard deviation than other LOs probably for the same reason discussed earlier.

The average of POs' attainments (Table 7) shows the same trend as for LOs' attainment, as the average of each PO attainment for each module is higher for the last two modules than the first two modules. The relevant standard deviation of each PO attainment is consistent for all modules except ENG1533 – the one that was discussed earlier. When the average of each PO attainments was taken for the same students over four semesters, the average shows almost the same results (fluctuated between 88.5 % and 93 %), with the exception of PO7 which shows 82 % attainment. PO7 states as: "Explain the global impact of professional engineering solutions in societal, economical and environmental contexts and demonstrate knowledge of and need for sustainable development." This particular PO could be considered as a real step towards engineers' involvement in their education in the social and economy fields. It seems that practicing real life needs more effort from engineering schools if they decide to produce better engineers who will face the reality after graduation and to help graduates passing the first year of their careers more confidently. The relevant standard deviation for PO7 is higher amongst POs considered for these modules.

The average of CDIO attainments (Table 8) for each module shows steady improvement as students have progressed from one semester to a higher one. The standard deviation for the same sequence shows that ENG1533 is the only one that has high result (STD of 11) and thus the module needs real consideration by reviewing the topics and/or modifying the assessment. When it comes to average of CDIO attainment over the four semesters, the trend is very similar to the previous CDIO's results, as the average increases steadily from 84.25 to 90.65 %. The standard deviation of the same sequence is consistent for Design (D), Implement (I), and Operate (O) while Conceive (C) shows very high result (STD of 10.75). While three of CDIO initiatives show satisfactory results, the Conceive is still behind.

5 Conclusions

The study shows the importance of CDIO initiatives as an indicator that ought to improve the engineering education. Researchers, educators, and scientists are still improving the CDIO initiatives, and this study could be the onset of similar yet more complicated studies to enhance the ability of engineering graduates. As the progress of technology, the CDIO became the cornerstone of the engineering education. In this study, readers can see clearly the depth of implementing this new system. The LOs and POs attainments show that ENG1533 (Engineering, Design, and Ergonomics) has fallen short compared to other three very similar modules. This result, even it is important, but the CDIO analysis has shown much deeper result in addition to the result mentioned above – it is simply the initiative "Conceive" (C) which has fallen for the students' group over the course of 2 years. Knowing this result will definitely help in crafting concise and accurate action in Continuous Quality Improvement (CQI) for Outcome-based Education (OBE) for programme review by making a special emphasis on whatever the missing part.

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E-Learning Pilot Project: Challenges and Initiatives in the Implementation of E-Learning in the Malaysian Studies Module at Taylor's University

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Abstract This paper examines the challenges faced and initiatives taken during the implementation of the e-learning content of the Malaysian Studies module to Generation Y students at its preliminary stages. The process of the implementation and the constraints faced during this teaching-learning process were among the points clarified in this study. This study spans from the initial stages of planning, implementation of the online module contents, and up to the reflections from the lecturers who have implemented the project. Through the qualitative strategy, a focus group discussion was conducted in July 2013 and data was collected from the lecturers who were involved in the development of the e-learning content of the module. The researchers noted the challenges faced by the students and the issues faced by the lecturers during the process. As a result, some initiatives have been outlined and implemented based on the input gathered from the focus group.

Keywords Malaysian studies • E-learning • Generation Y

1 Introduction

1.1 Malaysian Studies in Private Higher Education Institutions

Malaysian Studies is one of the compulsory subjects for every student attending a private higher education institution in Malaysia. In addition to this subject, the Private Higher Educational Institution Act 1996 (Act 555) provides that every private higher education institution shall teach National Language, Islamic Studies

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(for Muslim students), and Moral Education (for non-Muslim students). The Act states that these subjects must be taught along with the other courses offered in the private higher education institutions. It also mentions that all Malaysian students are compelled to attend classes and pass these compulsory subjects as a prerequisite to the award of a certificate, diploma, or degree.

In Taylor's University (TU), Malaysian Studies is taught under the Citizenship Values Education Programme (CVE) under the School of Liberal Arts and Sciences. It is also offered to the non-Malaysian students as an elective module. It carries three credits and is conducted on a face-to-face basis for either 10 weeks or 14 weeks. It is taught at two levels of studies for students at the foundation or diploma level and for students at the tertiary level. At the foundation or diploma level, this module is known as Malaysian Studies (MPW1133), and the same module taught at the tertiary level is known as Malaysian Studies (MPW2133). The content of this course is divided into four main chapters, namely, the Introduction to Malaysian Society, Political Process in Malaysia, Administrative Mechanism, and Government Policies. This module enables students to gain an understanding of Malaysian history, culture, politics, laws, and social and economic affairs. The objective of this course is to produce students who understand their role in nation building and to instill in them a spirit of patriotism.

The lecturers who deliver these compulsory modules face some challenges that may not be experienced by lecturers in other courses; the teaching of the Malaysian Studies module is no exemption. At Taylor's University, according to lecturers' observation, many students seem to have a negative perception towards this module because they feel that they were forced to learn it. They have a tendency to perceive this subject as less important than the other modules in their programs, and as a result, they have less interest to learn this module. The term "compulsory" that this module carries is a possible contribution to the negative perceptions among some students towards the module as well. This perception, in turn, affects their learning attitudes and performance. Furthermore, students' performance in Malaysian Studies is not included in the CGPA for most of the programs in Taylor's University. As they are only required to pass this module, most of them are not serious in wanting to learn this module which causes them to perform moderately.

Another common challenge in conducting this module is in the management of a large number of students. Since this module is offered to all the students on campus, each class has to accommodate a large number of students of up to 250 students per session. Due to this situation, the lecturers often face difficulties in maintaining students' motivation and attention in class. This will easily give an opportunity for students to engage in other activities that are not related to the class such as chitchatting, Facebooking, and completing homework or assignments for other subjects during lecture times. In order to overcome this problem, the lecturers have taken initiatives to conduct class activities to sustain the students' attention and participation in class. However, it is quite challenging to ensure that the activities conducted are engaging and effective for students' learning as the lecturers need to spend time monitoring them while they are participating in the activities. When the lecturer is

attending to a group of students in the class, the rest of the students might be doing other things. Some students might just ignore and choose not to participate because they are aware that it is difficult for the lecturer to identify them in such a big group.

1.2 Generation Y and Using Technology in Education

Generation Y is defined by Markerts (2004) as a demographic characteristic for people born between 1983 and 2005. Surrounded by gadgets such as iPads, laptops, and smartphones with information technology applications that abound, this generation is not short of exposure to the functions of these modern inventions. Through these fast-evolving gadgets, Generation Y's attention span is also affected by technology, especially in terms of their need for instant gratification (Lau and Phua 2011). This is particularly true in their need for immediate response from those around them or when in communication with others.

The vast exposure to technology also affects Generation Y's approach to their learning style. They are keen on learning via online. This eagerness is seen through the use of more interactive learning forms via the Internet and applications that have been created to facilitate their learning experience (Carver and Cockburn 2006).

Another aspect of the Generation Y learners is their emphasis on relationships and friendships. This need to be connected is supported by online systems such as the social media platforms. Thus, exchanges via forums serve as a preferred approach in the knowledge building process and gravitate towards activities promoting collaborative learning (Carver and Cockburn 2006). Therefore, the conventional chalk and board approach that had been used to disseminate information is no longer effective especially for the said generation.

1.3 Rationale for the Implementation of the Online Learning Module

Garisson and Anderson defined e-learning as a network or online learning that takes place in a formal context and uses a range of multimedia technologies (2003). It is a learning system supported by electronic hardware and software either online or offline. It can be carried out individually or on a small or large group basis and can be tied in with the conventional face-to-face format or in the open and distance learning (ODL) system. Therefore, e-learning is not confined simply to the boundaries of the online format, but it also includes the offline format using any form of electronic media to facilitate the teaching and learning process (Muhammad Rais and Yusup Hashim 2004). This is in tune with one of the main intentions of setting up the online learning module where the implementation of an online learning system is believed to be an effective approach to facilitate the teaching and learning process for Generation Y learners.

In addition, online learning is trusted to be an effective tool for a lecturer who has to conduct a class with a large number of students (Sheader et al. 2006). Furthermore, according to M Sasikumar, among the benefits of e-learning are the A3 factor (any time, any place, any pace), enhancement of learning experience and teaching quality, and the opportunity to gauge more systematic feedback and evaluation (2008). The A3 factor allows some freedom among students in determining the time, place, and pace of their learning and hence provides for adapting the teaching-learning process to the learner's individual characteristics.

Besides that, an effective e-learning approach enables a high degree of personalization and a wide range of instructional methods. The use of powerful simulation, multimedia, and high-end visualization support enables learners to relate to the module more deeply, thus enhancing their understanding. This is synchronous with the desires of the Generation Y learners. Better teaching quality can also be achieved as the lecturers will be creating electronic course materials which are reusable and can be shared among them. The materials created will go through a lot of improvement stages based on the users' feedback which could enhance the quality. As e-learning could offer a wide range of assessments and activities, it also assists the lecturers in gathering detailed feedback on various aspects of the course. For instance, the quality of questions and content, students' performance, and attitudes in adapting e-learning could be recorded for improvement purposes.

2 The Implementation of Online Learning in the Malaysian Studies Module at Taylor's University

The first stage of this project began with the development of the online module content in June 2012. It consisted of the mapping of the online learning module, learning materials, and activities. The team presented the first draft of the online module in August 2012 before the Dean of the School of Education and the advisor, Dr. Logendra. The first draft was later amended and improved based on the feedback and suggestions received during the presentation. The amendment process took place from August until December 2012 in which the team constantly presented and made improvements to the content under the supervision of Dr. Logendra. The final draft was approved in December 2012 and submitted for editing. The completed draft of the Malaysian Studies Online Module comprised of learning activities, materials, and assessments was then ready for its first launch.

The module is designed based on the approach to train students to be independent learners by employing virtual learning. Learning preferences outlined by Generation Y learners are their need for visual, nonlinear, virtual learning to take place with shorter segments of learning (Schofield and Honore 2010). With this in mind, students are given short tasks to attempt via the online module on a weekly basis. Online and face-to-face consultations were also provided by the lecturers to support students' learning.

Broken down to two elements, the e-learning consists of (1) the teaching and learning activities and (2) the assessments. Various teaching and learning activities were applied such as using the lecture capture method, watching relevant short video clips, reading online text, reading power point slides, reading relevant websites, and participating in online forums. Students had to take part in all activities uploaded online every week and submit the assessments. The assessments were assigned individually or on group bases which came in various forms such as submitting mind mapping activities, video reflections, or a wiki's group project. They were also required to complete online quizzes or participate in online forums as part of their assessment. The sample of weekly lesson can be seen in Fig. 1.

The online module for Malaysian Studies was first launched on January 2013. The module was implemented in three Malaysian studies classes as a pilot project which involved 363 students. For these three pilot classes, the online module was implemented on a weekly basis in addition to a face-to-face session which was conducted either 1 h per week or 2 h in every 2 weeks. Throughout the early implementation of this module, constant review and improvement were made to improve the teaching and learning activities. A focus group discussion among the lecturers involved in teaching and developing the content of this online module was also conducted to identify any issues and ways to enhance the implementation of the Malaysian Studies online module at Taylor's University. Students' responses and

Fig. 1 A sample of the story board indicating the online lesson conducted in week 4

feedback to this approach were also taken into account especially in improving the course delivery and rectifying technical problems they encountered while attempting the online module.

Since it was implemented from January 2013, approximately 3,500 students have participated in the module until July 2014. It was announced as the second and the fourth most active online modules on campus for the months of March and April in 2013. The students were from various schools such as School of Communication, School of Hospitality, Tourism and Culinary Arts, School of Architecture and Design, School of Business, School of Computing, School of Medicine, and the American Degree Programme. The students were mainly from the foundation, diploma, and degree programs.

2.1 Lecturers' Feedback on the Implementation of the Malaysian Studies Online Module

The feedback from lecturers was received from a focus group discussion attended by five lecturers involved in developing and teaching the online module. The focus group discussion was conducted on 25th March 2013 to discover lecturers' experience in conducting the module for the three pilot classes. Overall, the lecturers' feedback underscored two main aspects in the implementation of the online module: the challenges and the recommendation for improvement. There were several challenges faced by the lecturers in the implementation of this module. The challenges can be divided into three issues, which included technical problems, students' attitude, and lecturers' management of the online learning (Taylor's University 2013).

Among the technical issues faced were students were not able to access TIMeS especially in the beginning of semester due to add and drop sessions, unsettled fees, and changing of programs by the students. In some cases, students enrolled for the module after the add and drop sessions which caused them to miss the first class and some of them would have missed the second and third classes as well. In addition to this, some students were not able to submit their work online because of the file size that exceeds the limits of the system. In certain other cases, some students were also not able to access the links for videos used in the online lesson. Those were among the technical issues faced by the students during the implementation of the online module.

In addition to the technical issues faced by the students, the lecturers identified that there was insufficient content provided. For example, one of the subtopics under the Constitution was not covered in the online module. It was highlighted that few instructions given throughout the online module in certain weeks were not very clear because the lecturers had to clarify a lot of questions from the students regarding the tasks assigned.

In order to resolve these issues, the lecturers liaised with the Academic Services to ensure that students could assess TIMeS from the first week of the module. The

lecturers have given the students more time to attempt and submit the lessons or tasks for the first 3 weeks of the module. This is to enable students who missed the first few weeks of lessons to catch up. To resolve the issue of limited file size that could be submitted online, the lecturers planned to provide students with a standard answer sheets for them to submit their work. Finally, they will also improve on the insufficient content and ambiguous instructions in the online module.

Apart from the technical issues faced, the lecturers also faced challenges in managing the students' attitude towards online learning. According to them, most of the time, the students did not read the instructions carefully. This could be due to the need for immediacy and low boredom threshold that has been identified as troubling Generation Y learners (Schofield and Honore 2010). A majority of the students e-mailed the lecturers instead to request for an explanation on the tasks assigned without attempting the tasks first. This situation caused the lecturers to spend more time reading and replying students' e-mail. Some students were reluctant to participate in online learning especially students in the first semester. This is because they have just completed high school and were used to mainly face-to-face sessions. They were expecting to learn in the same method at the university level and were hesitant to commit to self-study. In addition, most of students at diploma level had problems in comprehending the content of certain topics in the online module system. This sense of "disconnect" or inability to comprehend the content among the students could be attributed to the high dependence of face-to-face interactions of the student (Stodel et al. 2006). This was further established when the lecturers found that they had to constantly remind the students to read the instructions carefully, and to improve on this situation, the lecturers proposed that a discussion forum be set up as a platform to communicate with the students rather than communicating via e-mail. This will be done by resetting the message setting in TIMeS so that messages will not be directed to the lecturers' Microsoft Outlook inbox. The lecturers were also willing to conduct consultation sessions with students who face problems adapting to the online learning system. They were also planning to organize a hands-on briefing on using TIMeS for e-learning purposes to help the students familiarize themselves with the system and to slowly adapt to the independent learning style.

Another issue brought up by the lecturers is the time constraint in managing the online module. They realized that their workload had increased since they were handling this online module because they had to spend a lot of time for administrating and managing the online learning especially for classes with a large number of students. The time they had to spend for these tasks was more than their allocated weekly teaching hours. Among the tasks involved were evaluating students' works on a weekly basis, preparation of weekly contents, monitoring the e-learning sessions, responding to students' e-mails, and assisting students with solving the technical problems. The e-learning module had increased the communication requirements principally via e-mail where the lecturers had to invest their time for enormous volumes of correspondence with students (Arabasz et al. 2003). They also found out that the students did not have adequate time for them to learn via online. This was because most of the students were experiencing online learning for

the first time and they had to spend the first 2 and 3 weeks to adjust to the system before they were able to familiarize with the system and adapt to the independent learning style. In order to counter this situation, few amendments were made throughout the implementation of this online module. Among them are to conduct a thorough briefing session during the first face-to-face session with the students. Even though a briefing session has been provided since this online module was implemented, the lecturers shared more information and details to ensure students have a better understanding especially on their tasks and the technical aspects in attempting this online module. In addition, the lecturers have amended the instructions conveyed via online to make it clearer and more precise to students. This is to avoid confusion among students as well as to minimize time spent replying their e-mail.

3 Conclusion

The e-learning initiative leads to a more progressive and independent learning approach. Although some studies have established that Generation Y learners are adept with technology, feedback from this study has shown that some were struggling with the move towards more independent learning which comes along with the e-learning approach. The cause of concern should not be in employing the system but more in the method in which the e-learning module should be administered. This can be done by managing the e-learning content well and maintaining a healthy line of communication with the students. David A. Amstrong reiterates the point above by stating that the role of communication is important in shaping the perceptions and participation of student in online learning (2011). Therefore, sooner or later, the majority of students will be interested in being fully committed to the online course (Buzzeto-More 2008; Tagoe 2012). Once the students have become accustomed to the e-learning method, they can then be further encouraged to engage in independent learning. This puts emphasis on teaching the students to attain lifelong learning skills. Thus, the students will no longer just learn content but acquire a better way to further themselves in the future. In fact, it is part of Taylor's Graduate Capabilities (TGC) which aims to develop knowledge, skills, abilities, and qualities among students especially in digital literacy, lifelong learning, discipline-specific knowledge, and citizenship and global perspectives. It may seem rather challenging at first with the students and lecturer facing stumbling blocks in implementing this e-learning module. It is also undeniable that there will be many improvements to be done as the project continues. However, as stated in an ancient proverb once, a journey of a thousand miles begins with a single step.

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Holistic Education and Teacher Professional Learning in the Twenty-First Century

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Abstract This paper explores models of teacher professional learning and development that support holistic education in the twenty-first century. Drawing on recent literature (e.g. Hargreaves, Fullan, Robinson, Shirley, Timperley and Hattie), it suggests that neo-liberal, market-based models of schooling, with a focus on standardised testing, narrow, back-to-basics curricula, uncritical application of technology and performance-related pay have demoralised and deskilled teachers. In order to meet the educational needs of all children and prepare them for happy and rewarding futures in a rapidly changing global environment, the evidence suggests that we need teachers who are enthusiastic, innovative and attentive to the social, emotional, physical, spiritual and intellectual growth of their learners. This paper proposes a cycle of ongoing professional learning and development that looks first at the holistic needs of learners and then at the consequent learning needs of their teachers and finally models the learning-focused relationships necessary for effective learning to take place.

Keywords Teacher professional learning • Holistic education • Twenty-first century

1 Introduction

The last few decades have seen a series of educational reforms implemented across much of the developed world (Hargreaves and Shirley 2012; OECD 2013; Earl and Katz 2007). These reforms have largely echoed the prevailing political and economic global environment, always with the stated goal of raising student achievement. International research, for example, the Organisation for Economic Co-operation and Development (OECD 2011; Hargreaves and Fullan 2012; Hargreaves and Shirley 2012), indicates that whereas some schools and systems, notably Finland, Singapore and Ontario, have succeeded and achieved excellent results, others such as most of the United States of America, England and parts of

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Australia have failed to make progress. There are, of course, many factors that contribute to these results, but the major difference appears to lie in the philosophies of change that underpinned the implementation of reform in these countries. Sahlberg (2011) cites increasing bureaucratic control, test-based accountability, innovation overload and performance-related pay for teachers as some of the least effective strategies for raising student achievement. Instead, it seems that teachers' knowledge, skills, attitudes and dispositions have the greatest influence on the success of the students that they teach; thus, the leadership and professional learning and support that teachers receive, particularly during times of change, are vitally important (Hattie 2012; Timperley et al. 2007).

2 The Global Educational Reform Movement ('GERM', Sahlberg 2011)

Until relatively recently, state education in most societies was a process of rote learning and memorisation with children being drilled in the basics of reading, writing and number plus behaviour such as compliance, punctuality and respecting one's elders (and betters). Children were trained to stand up when an adult entered the room and not to speak unless spoken to. They were sorted at a very early age and groomed to take their 'proper' place in society. The teacher's job was to impart facts and 'deliver' a curriculum so that children passed their examinations. This is often referred to as the 'industrial model' of education (Robinson 2013) and is still a common practice in many state schools around the world, including Malaysia.

During the 1960s, in what Hargreaves and Shirley (2012) refer to as the 'First Way' of educational reform, teachers in western civilisations would almost certainly talk about the purpose of education as being to develop the social, emotional, spiritual and intellectual growth of the 'whole child'. This notion of holistic education stems from the works of philosophers and educators such as Johann Pestalozzi, John Dewey, Maria Montessori and Rudolf Steiner, who all insisted that education should be the 'art of cultivating the moral, emotional, physical, psychological and spiritual dimensions of the developing child' (Miller 2014). In the eighteenth century, Jean-Jacques Rousseau pioneered the notion of children developing ideas for themselves and not merely relying on the authority of the teacher. In his book *Emile: Or A Treatise on Education*, instead of being taught other people's ideas, his character, Émile, is encouraged to draw his own conclusions from his own experience, what we might refer to today as 'discovery learning'. Despite Rousseau's concern for both public and private education, these beliefs about education are rarely found in the state sector and live on only in international private sector as, for example, Waldorf (Steiner) schools, Montessori kindergartens and Reggio Emilia preschools and in the 'Free School' movement, best exemplified by A. S. Neill's Summerhill School in England.

For most state education systems, the 1980s heralded challenges to the child-centred approach of the 1960s, and countries such as England, Australia, Chile and parts of Canada and the United States imposed centralised control of curricula, national standards for literacy and numeracy and standardised testing. These moves

were largely influenced by conservative political ideologies that championed a competitive market forces approach to public services. Ironically, this 'Business Capital' approach to teaching has not always had the desired effect of raising achievement (Hargreaves and Fullan 2008). England and many of the school districts in the United States languish in the lower regions of the international indicators of educational success (Hargreaves and Fullan 2012). As schools and even individual teachers are subjected to test-based accountability, these countries have seen a narrowed curriculum, reduction of teachers' pastoral roles and teachers who position themselves, 'to 'look good' rather than to achieve important goals' (Watkins 2008: 3). The United States and England have both introduced schemes for fast-tracking inexpensive young people into teaching, but Hargreaves and Shirley suggest that '… market place models of school improvement, technology as a replacement for teachers and pay for performance – are redefining the teaching profession as one where teachers are being trained faster, with careers that are shorter, even though most teachers do not hit peak periods of performance until at least four and often eight years into the job' (2012: x1).

The 'dumbing down' of teachers' work has left the teaching profession in many countries exhausted and demoralised (Hargreaves and Fullan 2012; Malm 2009; Sahlberg 2011; Watkins 2008). According to a poll commissioned by the National Union of Teachers (NUT 2013), 55 % of teachers in England say that their morale is currently low, or very low, and in the United States, an average of 30 % of newly qualified teachers leave the profession within the first few years of their careers (Hargreaves and Fullan 2012). As Chris Watkins points out, 'the factors which led teachers to join the profession (working with children or young people, and a creative, challenging role) are the same factors which inform why they stay, whereas the factors which demotivate them most are workload, initiative overload, and the target driven culture' (2008: 2).

It is interesting to note that the countries that regularly top the international achievement charts do not subscribe to this narrow view of education; they tend to hold the teaching profession in high regard, select the best graduates to train as teachers, involve teachers in policy and decision making and invest in high-quality, ongoing professional learning and development. What many international experts propose is that:

> To be high achieving, educators in school systems need the right kind of purpose that inspires them, a strengthened professionalism that propels them forward, and a cultural and structural coherence that holds them together. (Hargreaves and Shirley 2012: xi)

3 Education for the Twenty-First Century

In many countries, for example, Singapore, Finland and Sweden, the twenty-first century heralded a shift away from narrow, target-driven measures of achievement to a broader, more holistic understanding of learning. This is in part due to the recognition that, in a rapidly changing world, it is the application of learning, rather than the memorisation of facts that will best serve individuals and the societies in

which they live and work. Wiliam (2011) predicts that 'Most of the skills that you can learn when you're at school will not be applicable in the future … the one really competitive skill is the skill of being able to learn'. Schools are being redefined as 'learning communities', which favour collaboration rather than competition, skills for lifelong learning and the right of every child to have their gifts and talents cultivated through the process of education (Tyack and Cuban 1995).

Amongst others, research from Dweck (2006), Black and Wiliam (1998) and Hattie (2012) has helped us to switch to a language of learning and an understanding that given the right environment, all children can and do learn. There is a growing recognition that classroom climates must be conducive to learning; that is, they must be environments where children feel safe to take risks, ask questions and make mistakes without fear of humiliation (Dweck 2006). Assessment for learning has become an established practice in many schools and systems, and children are being encouraged to meet the challenges of the twenty-first century by becoming self-regulated, lifelong learners (Absolum 2006; Claxton 1999). Schooling is more than a means to an end, but Hattie informs us that 'the best predictor of health, wealth and happiness in later life is *not* school achievement, but the number of years in schooling. … This means that the school and learning experiences … must be productive, challenging and engaging to ensure the best chance possible that students will stay in school' (2012: 3).

The term 'personalising learning' has also become a catchphrase of the twenty-first-century learning. This is not individualisation of learning or even differentiation of learning, but rather it 'is about enhancing learning relationships to optimise the learner's engagement and success' (West-Burnham and Coates 2005: 9). The rapid development of the use of technology in education has been both lauded and criticised, according to the purpose and quality of its contribution to learning, but many educators are now using digital technology to support the personalisation of learning, especially at the higher levels of Bloom's taxonomy (McLaughlin and Lee 2010).

Consistent with a focus on higher-order thinking skills, education systems in many countries have introduced key competences into their curricula. The New Zealand National Curriculum, for example, incorporates the following competences: critical thinking; using language, symbols and text; managing self; relating to others; and participating and contributing. The European Mapping of Initiatives on the Development of Key Competences notes that 'All initiatives to some degree target the curriculum and the transformation of pedagogical practice so as to be more innovative, collaborative, motivational and student centred' and that 'the majority of initiatives also involve investment in in-service teacher training' (European Commission 2013).

4 Teacher Professional Learning and Development

While there is certainly a need for change in many schools and systems, we cannot do this without generating professional energy as well (Hargreaves and Shirley 2012; Wiliam 2011). In order to achieve this, Hargreaves and Fullan urge 'Teachers

should be treated with dignity, as people who have lives and careers, not just as performers who must produce results'. Imposing change is most likely to create resistance, whereas developing a collaborative culture of learning with high trust relationships is more likely to 'pull' teachers towards a commonly valued goal (Absolum 2006; Hargreaves and Fullan 2012).

All professional learning for teachers must have a focus on student learning (Guskey 2000; Joyce and Showers 2002; Hargreaves and Fullan 2012; Timperley et al. 2007). Timperley and colleagues point out that, like their students, teachers are diverse, their time is valuable and therefore any professional learning that they undertake must be engaging, interesting, personalised to their needs and relevant to the learning needs of their students (Timperley et al. 2007). Content knowledge, assessment knowledge and skills and pedagogical understanding and skills are all vital (Steiner 2004). As learning is cyclical, not linear, teachers need to be able to revisit partially understood ideas as they try them out in their everyday contexts. This paper has referred to the negative impact of innovation overload, and thus any new approach should be supported by research evidence in terms of student outcomes and all new ideas and approaches subjected to systematic inquiry (Guskey 2000); thus 'student achievement is the product of formal study by educators' (Joyce and Showers 2002: 3). Schools and systems should be wary of the 'novelty' effect; it is not sufficient for teachers to attend one-off courses with outside 'experts' (Cohen and Hill 2001; Darling-Hammond 1996). For their learning to be functional and 'make a difference', teachers need to understand the theory and philosophy that underpin the new practice and then work together with others in their own schools to support its implementation and to reflect its impact on the desired learning outcomes of their students (Hargreaves and Fullan 2012; Harwell 2003). Like all humans, teachers are creatures of habit. Improving practice requires changing habits, not adding new knowledge, and that is hard. At a recent assessment for learning workshop, Dylan Wiliam (2013) commented, 'the hardest bit is not getting new ideas into people's heads, it is getting the old ones out – and that takes time'. Hargreaves and Fullan state that 'It's about whether teachers are committed to, inquisitive about and increasingly knowledgeable and well-informed about becoming better practitioners together, using and deeply understanding all the technologies and strategies that can help them with this' (2012: 127).

In the 1980s, Beverly Showers and Bruce Joyce developed a model of peer coaching for teachers. The model has a focus on desired outcomes for students and involves regular seminars designed to enable teachers to practice and implement the content they are learning. The weekly coaching sessions focus on classroom implementation and the analysis of teaching, especially students' responses. Showers and Joyce emphasised the collegial nature of peer coaching and the need for a positive school culture for this to succeed:

> A cohesive school culture makes possible the collective decisions that generate school wide improvement efforts. The formation of peer coaching teams produces greater faculty cohesion and focus and, in turn, facilitates more skilful shared decision-making. A skilful staff development program results in a self-perpetuating process for change, as well as new knowledge and skills for teachers and increased learning for students. (Showers and Joyce 1996: 16)

Showers and Joyce found positive results from the coaching sessions, and the teachers who participated then formed small peer coaching groups – now frequently referred to as professional learning circles (PLC) or teacher professional learning circles (TPLC). According to Margaret Riel (2013: 1), a learning circle is 'a highly interactive, participatory structure for organizing group work. The goal is to build, share, and express knowledge though a process of open dialogue and deep reflection around issues or problems with a focus on a shared outcome'. In order to be effective, both peer coaching and teacher professional learning circles require a collaborative culture where strong, trusting, professional learning relationships have been developed (Absolum 2006; Hargreaves and Fullan 2012; Harwell 2003). In order for TPLC to be effective, Dylan Wiliam advocates certain conditions, amongst which is supportive accountability. He states that what is needed from teachers is a commitment to the continual improvement of practice and a focus on those things that make a difference to student learning and achievement. What is needed from leaders is a commitment to engineer effective learning environments for teachers by creating expectations for continually improving practice; keeping the focus on the things that make a difference to students; providing the time, space, dispensation and support for innovation; and supporting risk-taking.

5 Teacher Professional Learning at Two of Taylor's Schools

Bearing in mind the principles outlined above, different models of professional learning and development have been implemented at two very different Taylor's Schools, and each school has its own professional learning website of resources. At school A, there are four strands of professional learning: pedagogy, curriculum, information technology for teaching (IT) and teaching English to students across the curriculum (TESMC). Each teacher is expected to use the school's stated standards of teaching and learning to identify two goals for professional learning/development. All teachers meet for an hour after school on Mondays and follow a calendared series of professional learning events in addition to specific department and phase meetings. IT and TESMC are offered separately on an as-needs basis. The professional learning cycle is managed and evaluated by a professional learning committee of volunteers from across the school, which meets monthly together with the Director of Teaching and Learning Development (DTLD). About once a month, each member facilitates a TPLC with a focus on pedagogy, or the 'how' of teaching, primarily using assessment for learning principles and strategies. Common agenda for these meetings, based on Dylan Wiliam's (2013) model, involve the following: Activity 1, introduction (5 min); Activity 2, starter activity (5 min); Activity 3, feedback (15 min); Activity 4, new learning (introduced by the facilitator) (20 min); Activity 5, personal action planning (10 min); and Activity 6, review of learning (5 min). In addition to the TPLC meetings, all teachers engage in at least three peer observations across the course of the year. Training for this is given, particularly in the area of descriptive, formative feedback. A set of observation paperwork has

been made available on the website, and PL facilitators explain how to use these. Pre-observation meetings help teachers to explain the learning focus for their students as well as their personal learning goal, and teachers also use this meeting to specify what they hope the observer will see and what they would like feedback on. The teacher nominates up to four students that they would like the observer to talk to about their learning. During the observation, the observer makes notes on what is said by both teacher and students and what is written and displayed to assist learning, discusses the learning with nominated students and makes notes of student responses. A post-observation form is used to highlight points related to the teacher's goal and the students' learning, and this is used in the post-observation meeting. Some teachers have started to use video recordings of their lessons as a basis for discussion, and the Director of Teaching and Learning Development is available to model the process. Catch-up training sessions are available for new teachers or anyone that requests additional support. Monthly parent workshops help to develop a whole school learning community.

Qualitative evaluations using Guskey's '5 levels of evaluation' are conducted at the end of each semester, and these have indicated an increasingly positive response. On the whole, teachers feel that they are learning, that they are implementing what they learn into their lessons and that, as a result of these implementations, there is a positive impact on student engagement, learning and behaviour. Teachers also reported a more consistent approach to teaching and learning across the school and that the aspired for culture of learning-focused relationships is continuing to develop. Findings from the school's appraisal system confirm that teachers are more consistently applying the expected approaches.

At school B, many of the teachers are locally trained with experience of working in the Malaysian government system and most of the students are Malaysian. Cultural expectations and traditions impact on the pace of change, and the DTLD has conducted a number of parent workshops to help develop community understanding. On becoming an international school, the School Management Team prioritised student engagement and active learning as professional learning goals across the school. In the primary school, following a series of weekly after-school workshops and individual classroom observations and coaching by the Director of Teaching and Learning Development (DTLD), lead teachers were identified and invited to a 2-day intensive peer coaching workshop. Each of these teachers then facilitated a monthly TPLC at a time convenient to them and met together monthly, with the DTLD to process and plan the ongoing teacher professional learning at the school. Evaluation, based on Guskey's '5 level evaluation model', indicated that the primary school teachers had learnt a lot about engaging students in the learning process and were enjoying implementing these strategies in their lessons. The primary school management team now oversees this process with occasional input from the DTLD. In the secondary school, lead teachers also attended a 2-day coaching workshop and continue to meet regularly with the DTLD. Students have been engaged in the process of change, and a survey about conditions for effective teaching and learning was circulated to all secondary staff and students. This has been analysed and discussed by lead teachers and their departments in weekly meetings

and a set of guidelines produced. This process is ongoing but the initial, anecdotal responses have been extremely positive. Taylor's Recipe of core values has been a key to development in both primary and secondary sections of the school, with both students and teachers exploring what each of the values looks like in practice.

6 Conclusion

The industrial model of education is no longer relevant for twenty-first-century learners. The focus must be on learning and learning how to learn. The focus is now on educating the whole child so that they can be confident, capable members of the rapidly changing global environment. Skills such as critical thinking, collaboration and creativity must be integrated into the curricula. Research has informed the profession about the most effective pedagogies and strategies for effective learning, and technology has provided the means for personalising learning so that every child can be motivated and challenged to achieve. Teachers need the knowledge, skills, attitudes and dispositions that will enable them to adapt to the changing needs of their learners.

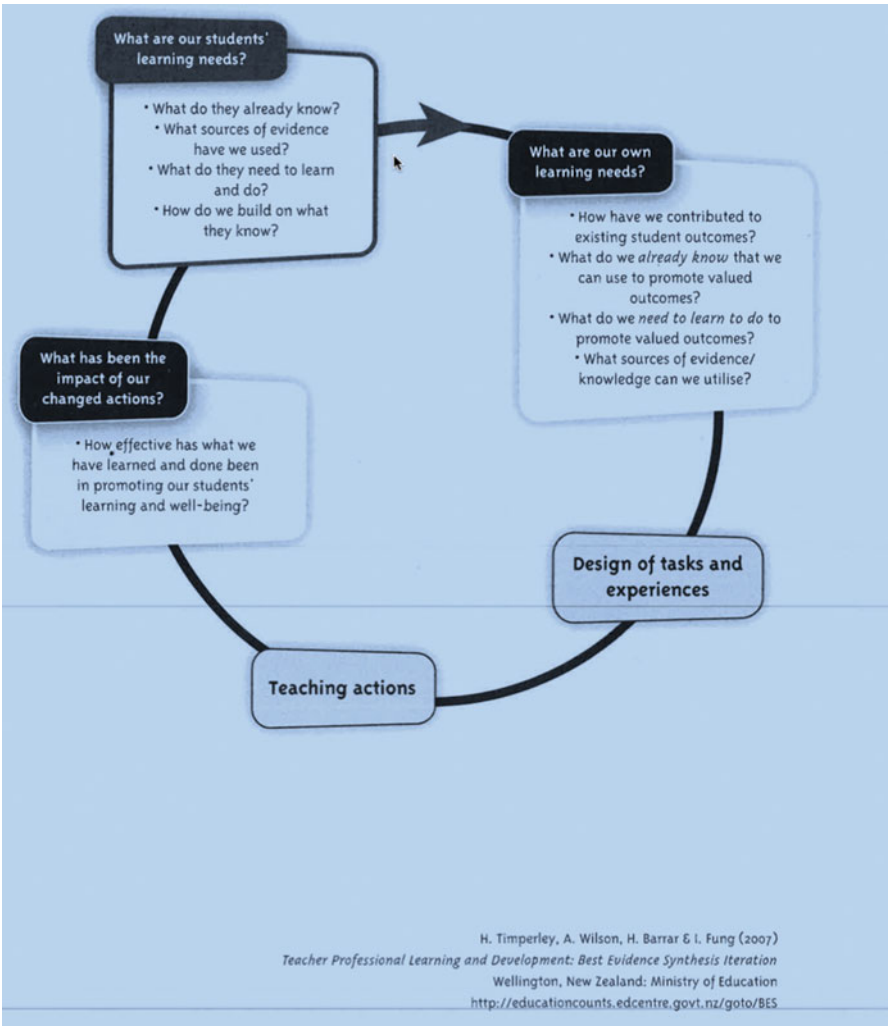
Over the past three decades, teachers throughout the developed world have been exposed to a plethora of educational reforms, as countries struggle to raise standards and lift achievement. In many countries, such as the United States of America and England, the focus has been on standards-based basic skills such as literacy and numeracy, and teachers have been subjected to test-based accountability and performance-related pay. In these countries, the reforms have been imposed upon teachers with a subsequent drop in teacher morale and retention. Neither country features highly in the international measures of student achievement.

The countries that feature in the top ranks of student achievement, such as Finland, Canada and Singapore, have created teaching as an attractive profession, which attracts high achieving graduates who are respected by the community and valued by their governments. In these countries, teachers have been involved in the process of change and not overwhelmed by imposed initiative overload. Ongoing teacher professional learning and development, with a focus on positive outcomes for students, is seen as a priority and financed accordingly.

There is no recipe for success, but there are certain indicators and lessons that can be learned. One goal for schools and systems is to create a supportive and collaborative professional culture, where teachers work together and share collective responsibility for the success of their learners. This involves a cycle of ongoing professional learning, where teachers first inquire into the learning needs of their students and then consider their own learning needs in relation to those. Following the implementation of new strategies, teachers reflect on the impact of their changed actions, share these with colleagues and begin the cycle again. There is always room for improvement.

> Each of us, throughout our entire careers, can keep on improving our own professional practice to make the lives of our young people and the world they will inherit a better place. (Hargreaves and Shirley 2012)

Appendix 1: Teacher Inquiry and Knowledge-Building Cycle to Promote Valued Student Outcomes



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The Multidisciplinary Engineering Project's Contribution Towards Holistic Education: A Case Study

Douglas Tong Kum Tien and Mohammad Taghi Hajibeigy

Abstract The demand for competent graduate engineers with capabilities to undertake complex multidisciplinary challenges has led to the introduction of multidisciplinary project-based learning at a relatively early stage in the engineering curriculum at Taylor's University. This paper documents a multidisciplinary group project to conceive, design, implement and operate an electric car for a single passenger undertaken by two third semester mechanical engineering and two third semester electrical and electronic engineering students under the supervision of the authors. As third semester students beginning with very little knowledge and experience related to the project, these students were able to successfully acquire the necessary skills and knowledge on their own, work together as a team and cross engineering disciplines to produce a fully functioning artefact within a very challenging timeframe of one semester. All three learning domains of cognitive, affective and psychomotor were significantly affected in the course of carrying out the project. A narrative feedback was solicited from the students after the completion of the project. The learning process, the social dynamics and the positive pedagogical outcomes achieved through this intense learning experience are evaluated and the factors contributing to holistic education are identified. A discussion on how holistic education outcomes were achieved as a consequence of participating in this project is presented in this case study.

Keywords Multidisciplinary engineering • Project-based learning • Holistic education • Learning domains

1 Introduction

Engineering challenges today are becoming increasingly complex and require nothing less than multidisciplinary approaches to overcome them. Hence, in the present context, engineers are expected to understand how to play a positive role and

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contribute effectively in a multidisciplinary environment. As a result, engineering programmes around the world have begun to include multidisciplinary projects and courses into their curriculum.

The recognition of the importance of taking a multidisciplinary approach to counter a "silo" mentality is not only recognised in the field of engineering but also in other fields (Masters et al. 2013). Furthermore, the advent to ICT has made the integration of multidisciplinary teams very conducive (Martinez et al. 2010) and can be expected to be even more so in the future.

Much informal learning takes place within the context of a multidisciplinary team. Rogers and Badger (2012) identified the potential that multidisciplinary teams have in offering the richest informal learning opportunities to its members and also in providing fast and imaginative solutions more frequently and with less effort. In addition, the opportunity of being immersed in these rich learning environments encouraged individuals to acquire knowledge at the fringe of or across disciplines and by doing so enhance their individual value.

Research was done at Georgia Tech where an engineering capstone design course compared the performance of multidisciplinary project teams against monodisciplinary project teams. Results indicated that the performance in innovation, utility, analysis, proof of concept and communication skills was superior for the multidisciplinary teams compared to monodisciplinary teams and also that on average, members of the multidisciplinary tended to be hired more frequently (Hotaling et al. 2012).

Likewise Bannerot et al. (2010) reported positive outcomes and encouraging student feedback received on an engineering multidisciplinary capstone design course undertaken by students where the project teams consisted of students from at least two or more engineering disciplines.

Apart from these, Rosca (2005) reported on the positive outcome of bringing together software engineering and business management graduate students to work on a joint multidisciplinary project. It was found that the quality of work was superior to those delivered in the previous years and that the students gave positive feedback about their experience. It is clear that students working together across disciplinary boundaries on a common project benefited in their learning and that it is apparent that these projects more closely resembled real-world scenarios.

Without doubt it is imperative that undergraduates in engineering programmes be exposed to a multidisciplinary environment at a very early stage in their undergraduate career so that a multidisciplinary environment becomes a normative in their experience which they will carry with them into their work environments in the future. This multidisciplinary mindset can certainly enhance their future contribution as an engineer and team leader.

On the other hand, it is necessary to guard against unintentionally instilling a "discipline superiority" or a "discipline exclusivity" mindset into the student. The students need to develop appreciation, healthy respect and the openness to want to learn from engineering disciplines different from the one that they had chosen to specialise in as an undergraduate. In a way this concept can be considered as holistic in an engineering sense.

The broader concept of holistic education as it relates to developing the cognitive, affective and psychomotor learning domains is also readily realised through a project-based learning approach such as this case study seeks to show. Project-based learning is an experiential learning method that is built on authentic, real-world situations and has been found to increase students' motivation as well as improve their ability to apply engineering knowledge and skills to real-world problems (Crawley et al. 2007).

2 Background of This Case Study

At Taylor's University School of Engineering, a core module titled Multidisciplinary Engineering Design is offered to students in the first semester of their second year (or third semester of study). As stated in the course outline, the objective of this module is to "introduce students to real-life work environments where engineers from different disciplines and backgrounds work together to realise a given task".

In this module, the students are expected to form groups of between four and six students comprising a mixture of majors from more than one engineering discipline. These groups are formed by the students themselves and not by being assigned to one by the supervisor(s) or module coordinator. Within the timeframe of one semester, the students are required to produce a functioning artefact and simultaneously satisfy all the assessment components of the module.

The learning outcomes taken from its course outline and listed below were intended to meet the objective of the module.

1. Explain the principles of design for sustainable development.
2. Apply the principles of physics to achieve a specific engineering task or to build an engineering artefact.
3. Evaluate different approaches to achieve a required end result.
4. Appraise and defend ideas.
5. Predict outcomes of suggested approaches.
6. Explain the benefits and barriers associated with multidisciplinary teams.

In the Taylor's University School of Engineering curriculum, project-based modules are being offered as core modules in every semester. The students were exposed to a multidisciplinary group project-based learning environment starting from semester one and continuing into semester two, three and four. However, as a general rule, the students, even while being involved in these multidisciplinary teams, tended to focus on contributing from within the boundaries of their own disciplines. The mechanical engineering students focused on the mechanical aspects of the project, the electrical and electronic engineering students likewise on the electrical and electronic systems and the same with the chemical engineering students with matters closely related to their discipline.

In this third semester multidisciplinary project presented as a case study in this paper, however, the students crossed disciplinary boundaries and contributed in crucial aspects of the project outside of their respective disciplines.

This project offered by the authors involved building a single passenger electric car for the purpose of participating in future electric car races. This can be considered as a relatively large and time-consuming project for one semester especially given the small number of students in the team and their inexperience. The students in this project team comprised of two mechanical engineering and two electrical and electronic engineering students. None of the students had any prior experience in designing and building an electric car, neither was there any specific content in the syllabus pertaining to electric cars.

The students were supervised by the authors, one who has an electrical and electronic engineering background, while the other has a mechanical engineering background.

3 Implementation

The students were given the responsibility to develop the work breakdown structure and Gantt chart and to divide up the tasks according to individual interests and capabilities. In addition to guidance from the supervisors, the students also received guidance from a senior year mechanical engineering student who had been part of a team that had built an internal combustion engine race car previously. This student was recruited by the supervisors to serve as an ad hoc advisor to the team.

With regard to electrical engineering matters, the students at times sought technical advice from one of their friends from another university who is a major in electronic engineering and who has a good grasp of both theory and practical matters in electrical and electronic engineering.

A mechanism for reporting progress and accountability was put in place. In addition to weekly meetings with supervisors regarding progress and upcoming issues, the students were also required to update their daily progress by email to the supervisors. This was subsequently extended to a weekly basis when the students proved their consistency in meeting tasks deadlines. These progress reports were considered by the supervisors as necessary due to the tight completion time in comparison to the magnitude of the task for this small team. A team member was designated as secretary for the group and was responsible to oversee these reports and to keep team members and supervisors updated regularly. The secretary acted as the main channel of communication among team members and with the supervisors.

The students were given the autonomy to select their own team leader who was responsible to ensure that tasks were completed according to the tight schedule, and that members showed up on time for all meetings and tasks.

It is necessary to mention that the students were fully engaged in the design and analysis aspects of the electric car and not merely the construction of it. Alternative

designs were considered, different options were continuously explored and design calculations were made including the load and torque calculations that form the basis upon which other design calculations and decisions were based. Such calculations were firmly supported by the principles of physics and mechanics. Safety was a paramount design consideration. Active and continuous learning was integrated into this module. Students were constantly searching for new ideas and information since they did not have any prior knowledge about this complex task. It was obvious that students throughout the semester were engaged in manipulating, applying, analysing and evaluating ideas.

Due to the small number of students in the team, the electrical and electronic engineering students helped with the mechanical design, CAD drawings, calculations and the fabrication of the mechanical components including welding of chassis and assembly of the brake, steering and suspension systems. Likewise the mechanical students involved themselves in understanding the electrical components such as the hub motor and batteries and the associated calculations and parts selection.

As a result of different personalities coming together to work under a very stressful assignment, friction between members was inevitable. The supervisors lend a listening ear to individual grievances and sought to placate these situations by offering helpful counsel. In order to strengthen the bond and break any communicational and social barrier, socialisation was encouraged. Outside activity and group lunching were planned on a regular basis by one of the supervisors.

Narrative feedback on the students' learning experiences was solicited upon project completion. A form was emailed to the students who then replied with their feedback.

4 Results and Discussion

4.1 The Artefact

A fully functioning single passenger electric car was completed as shown in Figs. 1 and 2. The car consisted of the chassis, the steering system, the suspension system, the braking system, the batteries and the hub motors. The car was successfully test driven by one of the students on a normal paved road used for regular automotive vehicles during the artefact demonstration with no problems encountered. The car continued to be functional and safe to use. The artefact outcome was successfully delivered by a team of semester three students within only one semester who started with little knowledge and experience besides having to cross into engineering disciplines other than their own to help one another.

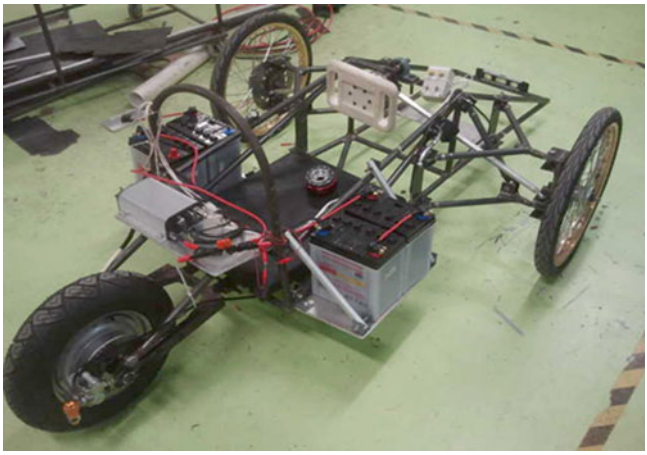

Fig. 1 Back view of the electric car

Fig. 2 Front view of the electric car

4.2 Students' Learning Achievements

As there were only four students in the team, it was decided that a qualitative approach would provide more insight than a quantitative approach. Excerpts from students' narrative feedback were reproduced in quotation marks and italicised below. The instrument used to solicit students' feedback is found in the Appendix.

With only four students in the team, the students were unanimous in regarding the project as overwhelming in terms of the workload and time commitment required of them. In spite of this, they regarded the experience positively and considered it beneficial as preparation to face challenges in the "real world".

I do think that it is necessary for students to be exposed to this subject and would most likely recommend others to take this module, but in my opinion, all these experiences I have acquired are majorly based on the project I am undertaking. If the project is too simple, there's not much we can experience. The project has to be somewhere difficult but possible to achieve.

This project could actually prepare me for difficult situations of deadlines and intense nights of nonstop working. This project had quite a lot of aspects such as project management, technical and hands-on work which I found them very helpful for my future.

The students also unanimously agreed that having to cross disciplinary boundaries is helpful for them and considered the experience very useful for their future work.

Yes, as a mechanical engineering student, I find it beneficial as I can learn something that is out of my field which can help me to explore greater possibilities in innovation and creativity…….Yes, it's crucial for student to be exposed to other disciplines so that they will be prepared to work with different types of people in the real world.

Yes I have faced challenges where I had learned things about electrical engineering so that I can solve a certain challenge and sometimes I had to combine both majors together to get a final answer…..I believe that it is necessary for an engineering student to be exposed in different majors at least in a basic level because this would help you to understand your coworker's ideas although theycame from different majors.

Yes, this experience is beneficial. I learn how to use all the tools and equipment that are generally used by mechanical students available at the lab. This is a valuable experience as I think that the real working world would want me to be knowledgeable and ready for all these types of equipment and tools. I also get to know about designing 3D objects through SolidWorks.

Yes, I do. This is extremely beneficial as it helps us understand what their limitations when it comes to design. This will help us to compromise each other so that both the mechanical and electrical part can be worked well together….. I have learnt how to use the machine in manufacturing workshop. It is beneficial as it helps EEs to better understand ME's limitation.

From the feedback received, the other key learning outcomes were time management, working with others and perseverance. These can be considered as the necessary ingredients for success of an engineer undertaking any project anywhere in the world.

Students' feedback regarding time management:

The biggest challenge is the time management. 14 weeks is considered as short for a project like this. It is in a scale so big that most people will doubt its completion in time not mentioning with the limited amount of experience and knowledge we initially possessed. However, we believe that we can only learn, gain experience and have fun when we get down and dirty in the process.

Project management, the processes for a project to be completed must be known even (before) the project is started so that every step is organised. Time should not be wasted or used unnecessarily.

The time constraints were the biggest challenge for my opinion as we have to finish in time but there will always be situation going on. So we have to work extra hard to catch up the previous wasted time.

Considering all the criteria in the designing stage before jumping to construction.

Students' feedback regarding working with others:

I was given a golden opportunity to work with different people in this team and this give me versatility in getting along with people in the future as there is a diversity of individuals that I am going to meet in the real world in the future.

I can say as a project manager the biggest challenge for me was to keep everyone happy about what they are doing and encourage them to work overnight……Listening to everyone's idea and respecting everyone in a team.

Teamwork, a good team will have greater capabilities to do wonders and it will definitely be better than the work of several individuals combined. Trust, it is important to trust all of the members involved as every single one plays a different role in a team.

Do not be scared of your boss/supervisor/manager. They are humans, so just be honest and tell them what's wrong. Just make sure you have the correct ideas.

Students' feedback regarding perseverance:

I have experienced the hardship of completing this project with only 4 members. In my opinion, this is very beneficial to me in a way that I now understand the pressure/stress/requirement of completing a huge project. This will greatly prepare me for the upcoming challenges in the real working world.

By challenging myself for a tougher job, I believe I would be more mature in making decision. Besides that, I have learnt how to communicate effectively to convey the ideas I wanted to share.

While the final outcome was achieved and students were on the whole very positive about their learning experiences, it was not without challenges as reflected in these personal student comments below. These following feedback were individual comments and may not necessarily represent the opinion of the entire team.

I think the biggest challenge faced in this project was the group itself. In my opinion, we lacked a proper team and a team leader. There was no proper direction as the team was heading aimlessly trying to complete the project. So far by sheer will and patience, we were finally able to complete the project but I think it can be done better.

Be punctual. Someone will always be late for meeting, and it always delays our time. Other than that, when you are late, people have to explain all of the things again and sometimes he or she had completely miss out an important details.

I will recommend you truly be yourself, and actually talk to yourself, do you like this project? If yes, go for it. However, if you ever have one bit of doubt that can you do it? No, please find your better own goal.

The authors would regard all experiences whether positive or negative as beneficial learning outcomes in producing capable engineers conversant in both the hard technical aspects of engineering and the soft skills of leadership and working with others. Negative experiences allowed for maturity and growth as the students learned to deal with them. Students should not be shielded from these experiences but instead should be encouraged to learn from them.

The observations drawn from the feedback were:

1. The magnitude of the task was huge and level of difficulty considerably high for students at this stage of their training.
2. Crossing disciplinary boundaries, not just in a cursory manner but actually being immersed in it and making significant contributions, was an effective learning experience.
3. The key learning outcomes apart from technical skills were the soft skills of time management, working with others and perseverance. The time constraint and the challenge of the task were the means whereby these soft skills were nurtured.

If educating all the three learning domains of cognitive, affective and psychomotor domains can be considered as one possible definition of holistic education, then

this case study has demonstrated the successful attainment of this objective by this definition. In this case study, the students demonstrated the cognitive ability to self-learn, to design, to evaluate alternatives, to make the calculations needed and to plan and execute the project. The affective elements were the soft skills that they have to develop without which they would not have been able to successfully deliver a fully functioning artefact on schedule. The psychomotor elements were the skills that they managed to acquire to build the artefact.

While this case study is limited to only one group of four students working on a multidisciplinary engineering project, it is hoped that the observations made and the experiences shared may still prove to be beneficial in some way to supervisors of similar projects across every discipline.

5 Conclusion

A multidisciplinary engineering design project consisting of designing and building an electric car was successfully completed in one semester by four third semester students from the mechanical engineering and electrical and electronic engineering programmes. The students involved in the project not only worked within the boundaries of their own engineering disciplines but also contributed significantly across disciplinary boundaries. The students managed to learn the necessary skills in their effort to become competent and successful future engineers. These included not just technical skills but also project and time management skills, a variety of soft skills together with the appreciation of engineering disciplines other than their own and a willingness to engage in it. All three learning domains of the cognitive, affective and psychomotor were effectively engaged and challenged.

This case study was first published in the 10th International CDIO Conference Proceedings (Tong and Hajibeigy 2014) but in the context of achieving CDIO outcomes.

Appendix

Questionnaire: Electric Car Multidisciplinary Project

Full Name:

1. How do you think your participation in this project helped prepare you to face the challenges in the real world? Please explain.
2. As a mechanical (or electrical and electronic) student, did you have to cross disciplinary boundaries to take on tasks regarded as electrical electronic (or mechanical) in nature? Was this experience beneficial? Please explain.

3. What was the biggest challenge you faced in undertaking this project? How did you overcome it? Please explain. (The challenge may or may not be related to a technical challenge.)
4. What did you learn from this experience? List down three things and explain.
5. Do you think in this era it is necessary for students to expose to multidisciplinary project, and do you recommend to others to take this module?

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YouTube and English Literature: Beyond the Chalk and Board

Malissa Maria Mahmud, Chandra Reka Ramachandiran, and Othman Ismail

Abstract Literature represents culture, tradition, and language. Hence, delving into a piece of literary work could enlighten students to a whole new world of experience, and oftentimes, students from different cultures are not able to relate and understand the contextual facets in some literary works. Such ramification makes it harder for the students to understand and even be interested in literature. In some cases, authors of the literary works could be writing from their own cultural paradigm, and consequently, students may find some contexts irrelevant and feel utterly disheartened. With technology incessantly advancing, there are many ways on how teaching and learning can vastly be enriched with the aid of technology. YouTube which is a form of multimedia where users share, view, and upload videos could be an effective instrument to stir and intrigue interest among the students. With the features of audio and visual images, YouTube could be exploited to benefit the students, and educators can incorporate multimedia materials in class and add audiovisual materials such as pertinent videos from YouTube to aid in the students' literature learning whereby it could spark interest and motivate them to learn. The research was carried out as a quantitative research where it draws upon the correlations between YouTube videos and comprehension skills and how it is a beneficial instrument in language learning. The results indicate that the respondents find that YouTube is "an online learning tool which can be useful in a language classroom." The manifestation of such approach in a language classroom is undoubtedly appreciated because YouTube offers various styles and genres of the language and it helps students discover the target culture in a variation of resources as well as it creates learning autonomy since it encourages them to watch clips unremittingly.

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Keywords Literature • YouTube • Instruments • Classroom • Language • Autonomy

1 Introduction

Victor Hugo once said, "Nothing is so powerful as an idea whose time has come." Computer and technology are ubiquitous than ever before and have radically changed the practices of education in the twenty-first century and will continue to do so; however, the extent to which technological change has enhanced or transformed teaching and learning rests a topic of debate among educators. Today, technology has presented many new prospects and advanced ways to incorporate online resources into traditional classroom learning, especially in language learning. It is said that with the use of pictures and videos from multimedia, it improves the students' listening and comprehension skills (Plass and Jones 2005). In an experiment conducted by Andrew Swedberg on his students at the United States Military Academy in 2012, he found that Khan Academy videos, used as supplementary resources, can aid students in learning. Some examples of online multimedia resources are popular websites such as YouTube, Google Video, and Vimeo. YouTube is a video-sharing website that allows users to upload, share, and view videos, as cited in Alwehaibi (2013). YouTube can also give students an interesting English learning experience under the circumstance that the videos are relevant, beneficial, and somewhat stir motivation while learning in class (Kelsen 2009). Studies have shown that YouTube offers an idyllic platform when lecturers integrate audio blogs into the classroom and they can use such blogs to manage oral assignments, interact with the students, and evaluate their performance outcomes (Hsu et al. 2008). YouTube can aid in improving reading and comprehension skills and it is a beneficial tool in terms of language learning, as shown in an interview conducted with students, where they found that YouTube is a "great online learning tool and it is useful for learning a language in and out of the classroom. You can find various styles and genres of the language, YouTube can help students explore the target culture in a variety of ways and it can help students develop their learning autonomy levels as it encourages them to watch videos and clips continuously" (Alimemaj 2010).

2 Problem Statement

One of the most widely spoken languages in the world, the English language has been acknowledged as one of the languages of information. Lexis or semantic in English language governs the speakers' competence and, ultimately, regulates efficacious communication. Learning English literature, however, has proven to be

challenging for many tertiary students. One of the reasons is the teaching approaches utilized by the instructors. In a study done in Pakistan, the educators in most of the government schools are not qualified and have inadequate knowledge in the methods of teaching English literature, and the traditional classrooms often lack audiovisual aids in learning (Ahmad et al. 2013). Incompetent, unenthusiastic, and unimaginative educators often kill the students' interest in learning literature. The teaching styles do not appeal to students learning literature, especially when literature is a subject that they must take.

With technology continuously advancing, there are many ways that learning and teaching can vastly be improved with the aid of technology. YouTube is an effective tool in terms of stirring interest and increasing the understanding of students who are learning literature. With the aid of audio and visual images, YouTube can catch the attention of students and students can actually watch and listen to the literature work. The videos present literature in a creative and flexible way; instead of having the students to only read the literature text, they get to watch and even interact, and therefore, they get a better understanding. Educators can incorporate more multimedia materials in class. Educational institutions can hire or train the educators to be more competent and to train them to learn how to use the technology given, as well as the types of teaching methodologies that incorporate multimedia in class. Educators should add audiovisual materials such as videos from YouTube to aid in the students' literature learning, and it can even spark interest and motivate them to learn (Ahmad et al. 2013).

3 Literature Review

3.1 The Perception of YouTube in Learning English Literature

Literature is defined as "written works, especially those considered of superior or lasting artistic merit, the word originated via French from Latin litteratura, from littera" (Keir 2013). To understand how effective YouTube is in learning English, we must first understand what YouTube is. YouTube is a video-sharing website that allows users to upload, share, and view videos, as cited in Alwehaibi (2013). There is a wide range of reasons how and why YouTube is an effective multimedia tool, and it arguably could be even better than other learning tools. Alwehaibi stated that YouTube should be considered as an effective instructional tool for developing content learning of EFL college students and results have shown positive impact in terms of enhancing students' learning, as YouTube provided an enjoyable and engaging atmosphere. YouTube inspired the students to learn (2013) and it also encourages student engagement and promotes a mixture of the course content, sparking further interest in learning literature (Burke et al. 2009). YouTube can aid in helping lower-level learners learn English literature. Weak students who lack motivation and interest in learning traditional contexts are more motivated when

they are given authentic situations, resulting from the YouTube videos. It also aids in comprehension and listening skills (Oddone 2011).

With the multitudes of demands in teaching and learning, educators have tried to use different ways to incorporate other sources and materials into classroom teaching. Different varieties of online websites have been used and the most commonly used website would be YouTube. Khalid (2012) mentioned that YouTube is regarded to be more effective than the novel itself when it comes to dealing with the student's difficulties in understanding the literature context. The study indicated that YouTube was in fact effective in promoting better learning of literature, in terms of memory and understanding, but it cannot be used alone as a teaching material but only as a supplementary material to aid the literature context. Berk also mentioned that not only does it help in memorizing and understanding; it also increases creativity (Berk 2009). In one research, it is conferred that students find the experience of using YouTube as interesting, relevant, beneficial, and somewhat motivating in class when learning English. Educators and students can benefit from the engagement of creative ways to incorporate YouTube to improve their learning outcomes when learning literature (Kelsen 2009). Based on a study by Snyder and Burke, students stated that they think YouTube is easy to use and can enhance their learning and meet educational needs in class and suggest that educators use it as a teaching material (2008).

The acuity of YouTube for being effective and enjoyable is common among students who often use YouTube. YouTube videos are also an effective and alternative means of learning as it provides different views and opinions on subjects, unique delivery mechanisms, and relatable examples for the students to understand better in their classes (Tan and Pearce 2011). Multimedia instruction creates the opportunity for learners to improve their English learning effectively. It provides different learning styles to suit each student; with multimedia tools, it can be very helpful and beneficial to students in learning English (Gilakjani 2012). Yadav stated that multimedia such as YouTube can provide multiple learning opportunities. Although it can make learning and teaching environments meaningful and effective, multimedia by itself does not assure a good learning and teaching environment and cannot be used solely as a teaching material (2013). YouTube has shown many positive repercussions in literature learning for students as it increases understanding, making learning more interesting, and the combination of audio and pictures can apply to students in a classroom with different learning styles. Even though most studies have shown positive impacts, Alimemaj argued that using YouTube in class can be a challenge because the poor sound quality, pronunciation, and slang can make watching the short videos difficult. Educators should know that they can also find irrelevant and "adult-only content" on YouTube and would need to be cautious. Alimemaj further stated that without guidance or a qualified educator who knows how to use YouTube correctly, YouTube might not be as effective as it can be (2010).

3.2 The Effectiveness of YouTube on Learning and Understanding Vocabulary

Vocabulary can be defined as "the sum of words, phrases and idioms which form a language. Since the term 'vocabulary' denotes not only single word, but also phrases made up of two or three words and multi words idioms, such as 'call it a day, or 'a bolt from the blue" (Hassan 2012) and it is "a list of difficult or unfamiliar words with an explanation of their meanings, accompanying a piece of specialist or foreign-language text" (Keir 2013). YouTube videos enable educators to attach the students to the "real-life" nature of these videos. By creating context for these short videos, students can be helped to explore a world of online English learning possibilities and can even improve listening, reading, and writing skills (BBC 2009). YouTube videos can be used in an ELT classroom for various teaching of vocabulary, accents, pronunciations, and voice modulation (BBC 2009). Alimemaj also argues that YouTube can allow students to learn vocabulary in the actual context and it may act as a motivating factor for student to further develop their language skills and gain their understanding of the content. YouTube does not only present opportunities but also challenges because even though YouTube offers a variety of clips of authentic examples of "everyday" English used by people within a wide range of contexts, the poor sound quality, pronunciation, and slang featured in the short videos can make it tougher instead for the students to understand the language and context (Alimemaj 2010). How effective YouTube vocabulary learning is the fact that it enhances conversation, listening, reading, and pronunciation skills, and it also promotes authentic vocabulary development for the students (Watkins and Wilkins 2011). According to Rusanganwa, with the help of multimedia, students perform better than those who learn under the traditional chalk and board class, and the different variety of materials from multimedia can appeal to different learning styles among students (2013). In a study by Silverman and Hines, it was shown that it would be effective if multimedia was used in promoting vocabulary knowledge. The dynamic visuals, sounds, verbal definition, and static pictures present in the video may provide multiple means to acquire word knowledge (2009).

Authentic materials from the multimedia sources are good in terms of learning new words in their contexts, as the videos often project authentic and "every day" use of English words (Asgari 2011), and one's vocabulary can be augmented through the enhancement of word recognition ability under the conditions of multimedia environment (Hu and Deng 2007). A study by Dr. Yi-Chuan Hsieh has resulted in the fact that that the effect of multimedia annotation on word retention was superior as compared to conventional printed pages. The words the students have learned could be memorized and remembered easier and they could retain the word for a longer period of time as compared to the students learning from the conventional printed pages (n.d.). Multimedia Vocabulary Annotations (MVA) are becoming more and more widely used. Studies have discovered the positive

correlations of MVA on simplifying and helping vocabulary learning among students that could ultimately enhance comprehension in L2 reading and listening processes (Xu 2010). The findings of this study show that multimedia annotations had an impact on the EFL learner's vocabulary learning and that presenting an explanation with the aid of words, pictures, and audio is much more effective than presenting an explanation in just plain words. He also found out that the learners could remember better after looking at visual images rather than just the plain text (Ahangari and Abdollahpour 2010). Although studies have shown that YouTube is indeed effective when learning vocabulary, it cannot be used as a teaching material solely on its own; it needs to be incorporated with the original text in order to reach its effectiveness. With qualified educators, YouTube can be incorporated into the class to help students in learning English vocabulary.

4 Methodology

4.1 Participants

This research paper was conducted during the August (fall) 2013 semester and the participants consisted of the transfer students of the American Degree Transfer Program of Sunway University. A total of 120 students took part in this research.

4.2 Instrument

The research was carried out as a quantitative research. The survey questionnaire consisted of two (2) sections: Section 1 and Section 2. Section 1 contained four questions that surveyed the demographic of the participants to obtain the participant's background information. Section 2 contained two parts: Part A and Part B, each with ten questions. Part A examined the participants' perception towards YouTube and literature in general while Part B looked at how the participants perceived the effect of YouTube on their vocabulary acquisition. There were 20 questions in total that respondents had to answer on a 5-point Likert scale (1 being strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 being strongly agree). The research was done via an experimental design in order to attain a better understanding on the causal interpretation. The experimental treatment in this study was set within two conditions for the two groups of respondents where one group experienced an intervention of a YouTube video of a poem and one group is without the video whereby they were only given a hard copy of a poem. Henceforth, the independent variable was the presence of a YouTube video while the dependent variable was the effectiveness of students' understanding of the vocabulary. The control group was required to read the poem only while the experimental group read the poem and watched the video. Each group had 60 students as respondents and subsequently, the students/respondents were asked to participate in the survey questionnaire and results were tabulated.

5 Results

There were a total of 120 respondents/students participated in the research. After all data was collected, the statistics were used to analyze the data. Frequency distribution, mean, and standard deviation were computed to describe the results of the research. In addition, the statistics were used to help explain the relationship between the independent variable and dependent variable when the analysis yielded significant statistics. These statistics were used for the purpose of comparison between the control group and experimental group in their preference about the intervention of the YouTube video, that being the variable that made the experiment more interesting. The variations between the two groups helped prove that YouTube videos are indeed effective.

Table 1 highlights the demographics section of the paper-based survey filled in by the control group of the conducted study. It includes the distinction of the gender of participants, their age, the number of years that they have been studying the English language, and the major that they are pursuing. For this particular group, 60 male and females participated in the study. As results show, the majority of participants were male, making up 60 % of the control group, while the counterpart, females,

Table 1 Demographics of participants

	Control group		Experimental group	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Gender				
Male	36	60.00	38	63.33
Female	24	40.00	22	36.67
Age				
17	1	1.67	0	0.00
18	20	33.33	18	30.00
19	19	31.67	17	28.33
20	6	10.00	12	20.00
21	7	11.67	6	10.00
22	4	6.67	4	6.67
23	3	5.00	2	3.33
24	0	0.00	1	1.67
Year of English learning				
Less than 3 years	0	0.00	0	0.00
3–5 years	3	5.00	5	8.33
5–10 years	15	25.00	14	23.33
10 years and above	42	70.00	41	68.33
Major				
Science	33	55.00	26	43.33
Arts	26	43.33	34	56.67
Undecided	1	1.67	0	0.00

made up 40 %. Participant age ranged from 17 to 24, with 18 being the average age. All participants have learned English for at least 3 years, with 70 % of them having studied English for more than 10 years. 55 % of the participants were Science majors, 43.33 % were Arts majors, and one participant was undecided. The percentage of males is higher than females in experimental group where males stretched a slightly higher percentage of 63.33 % than 60 % of the control group. The females on the other hand experimental group had a slightly lower percentage of 36.67 % as compared to the control group which reached 40 %. From an age range from 17 to 24, most of the participants were 18 years old and one participant only was 24 years old. These participants mostly had more than 10 years of experience with the English language learning aspect reaching a percentage of 68.33 % while only 8.33 % of them had 3–5 years of experience. What differs in this group in terms of majors is that this group has a higher percentage of Arts major students (56.67 %) than the Science major (43.33 %) as compared to the control groups' majors which enjoyed a higher percentage of Science majors than Arts majors.

Table 2 explains the first part of questionnaire. The results show the lowest percentage of disagreement was for the third statement which was "watching YouTube videos makes learning English literature easier." On the other hand, the statement that had the highest percentage of disagreement was the sixth statement which was "Watching YouTube videos in class increases my writing creativity in English literature." Second in scale came the neutral participants who didn't agree nor disagree with the statement. In this group of neutrality, highest percentage went with statement that said "Watching YouTube videos has motivated me to learn more about English literature" while the lowest was the one stated as "YouTube videos make a class more interesting and beneficial when learning English literature." In the scale of agreement with a certain statement, the highest percentage went with the statement that said "YouTube videos make a class more interesting and beneficial when learning English literature" which is the statement that only 3.33 % of the participants of that particular statement disagreed with and 18.33 % were neutral about it. Finally, the statement with lowest percentage of agreement with was "Watching YouTube videos has motivated me to learn more about English literature" which is the same statement that 13.33 % disagreed with and 46.66 % were neutral about that statement. The above table also depicts the first part of the result of the experimental groups. Results show that the highest percentage of agreement of 78.33 % was with the statement that said "YouTube videos make a class more interesting and beneficial when learning English literature" while the lowest of agreement statement was the one that stated that "Watching YouTube videos has sparked my interest towards English literature" having 28.33 %. However, the statement that had the highest percentage of disagreement was the one stated as "Watching YouTube videos has motivated me to learn more about English literature" having a percentage of 20 % while the lowest percentage of disagreement with a statement was stated as "YouTube videos make a class more interesting and beneficial when learning English literature" which is the statement that had the highest percentage of agreement, and also, this statement had a neutrality percentage of 21.67 %. Further along, the neutral scales' highest percentage was with the statement

Table 2 Part A statements

Item	Control group								Experimental Group							
	Degree of frequency						Mean	Std. Dev.	Degree of frequency						Mean	Std. Dev.
	Disagree		Neutral		Agree				Disagree		Neutral		Agree			
	F	%	F	%	F	%			F	%	F	%	F	%		
1. YouTube is an effective tool to learn literature	8	13.33	12	20	40	66.67	7	2.85	2	3.33	26	43.33	32	53.33	6.2	3.02
2. YouTube videos make a class more interesting and beneficial when learning English literature	2	3.33	11	18.33	47	78.33	7.7	2.49	0	0	13	21.67	47	78.33	7.7	2.49
3. Watching YouTube videos makes learning English literature easier	1	1.67	22	36.67	37	61.66	6.7	2.94	1	1.67	21	35	38	63.33	6.8	2.92
4. Watching YouTube videos in class increases my understanding towards English literature	3	5	20	33.33	37	61.66	6.7	2.94	1	1.67	22	36.67	37	61.66	6.7	2.94
5. Watching YouTube videos in class increases my enthusiasm towards English literature	4	6.67	20	33.33	36	60	6.6	2.96	6	10	18	30	36	60	6.6	2.96
6. Watching YouTube videos in class increases my writing creativity in English literature.	11	18.33	17	28.33	32	53.33	6.2	3.02	8	13.33	21	35	31	51.67	6.1	3.02
7. Watching YouTube videos has sparked my interest towards English literature	10	16.67	23	38.33	27	45	5.7	3.01	15	25	28	46.66	17	28.33	4.7	2.73
8. I would recommend the use of YouTube videos as a supplementary source when learning literature	5	8.33	14	23.33	41	68.33	7.1	2.81	5	8.33	17	28.33	38	63.33	6.8	2.92
9. Watching YouTube videos has motivated me to learn more about English literature	8	13.33	28	46.66	24	40	5.4	2.96	12	20	30	50	18	30	4.8	2.77
10. YouTube videos give better insight and knowledge when English literature is presented	4	6.67	25	41.67	31	51.67	6.1	3.02	4	6.67	19	31.67	37	61.66	6.7	2.94

that said "Watching YouTube videos has sparked my interest towards English literature" which was also the statement that was least agreed with. The lowest percentage of neutrality statement was the one that stated as "Watching YouTube videos in class increases my enthusiasm towards English literature."

Table 3 illustrates the second part of statements in the questionnaire that showed more variations in percentage. The statement that had the highest percentage of agreement was the one that stated "The visual images and audio of the videos help me understand the vocabulary used better," and yet, this group wasn't exposed to the YouTube video intervention. Participants had low agreement with the statement that said "I think that YouTube videos are an essential tool to learn new vocabulary" although the videos did improve the understanding of the vocabulary used. Disagreement was high in the statement that indicated that "Using YouTube videos helps improve my vocabulary" and low when a statement said that "The visual images and audio of the videos help me understand the vocabulary used better" which was the statement that had the highest percentage of agreement. Neutrality also varied as opposed to the statements in part A where the highest percentage statement that participants were neutral with was the one that stated as "I feel more motivated to learn about the difficult vocabulary after I watched related YouTube videos" and the lowest was "The visual images and audio of the videos help me understand the vocabulary used better" which again had the highest percentage of agreement and lowest disagreement.

The table above also displays the results of the second section for the experimental after the YouTube video intervention was shown to the participants. Participants gave the highest percentage of agreement of 76.67 % with the statement that said "The visual images and audio of the videos help me understand the vocabulary used better" while the statement that had the lowest percentage of agreement of 55 % stated "I feel more motivated to learn about the difficult vocabulary after I watched related YouTube videos." The degree of neutrality in this part varied from a high percentage of 40 % with the statement that said "I feel more motivated to learn about the difficult vocabulary after I watched related YouTube videos" to a low percentage of 15 % with the statement that said "Watching YouTube videos repeatedly improved my vocabulary." The disagreement category results a high percentage of only 13.33 % with the statement that said "Watching YouTube videos repeatedly improved my vocabulary" which was also the statement that had the lowest percentage of neutrality. The lowest percentage of disagreed statement was the one that said "Using YouTube improves my vocabulary usage skills" having a percentage of 1.67 %.

6 Discussion

It was conjectured that participants would agree with the effectiveness of YouTube as a tool to learn literature. This is confirmed by the results shown by both control and experimental group participants, most of whom (control, 66.67 %; experimental, 53.33 %) agreed that "YouTube is an effective tool to learn literature" when

Table 3 Part B statements

Item	Control group								Experimental group							
	Degree of frequency						Mean	Std. Dev.	Degree of frequency						Mean for all	Std. Dev.
	Disagree		Neutral		Agree				Disagree		Neutral		Agree			
	F	%	F	%	F	%			F	%	F	%	F	%		
1. YouTube can be used to aid in vocabulary learning.	5	8.33	16	26.67	39	65	6.9	2.89	3	5	16	26.67	41	68.33	7.1	2.81
2. YouTube promotes vocabulary learning development.	6	10	23	38.33	31	51.67	6.1	3.02	3	5	17	28.33	40	66.67	7	2.85
3. Using YouTube improves my vocabulary usage skills.	8	13.33	15	25	37	61.66	6.7	2.94	1	1.67	16	26.67	43	71.67	7.3	2.73
4. Using YouTube videos help improve my vocabulary.	15	25	12	20	33	55	6.3	3.01	4	6.67	20	33.33	36	60	6.6	2.96
5. My vocabulary can be improved if the literature work is presented in interesting ways for example using YouTube videos.	5	8.33	12	20	43	71.67	7.3	2.73	0	0	14	23.33	46	76.67	7.6	2.56
6. Watching YouTube videos repeatedly improved my vocabulary.	7	11.67	17	28.33	36	60	6.6	2.96	8	13.30	9	15	43	71.67	7.3	2.73
7. Practicing vocabulary using YouTube videos helps me learn more vocabulary.	8	13.33	22	36.67	30	50	6	3.03	2	3.33	15	25	43	71.67	7.3	2.73
8. I think that YouTube videos are an essential tool to learn new vocabulary.	13	21.67	22	36.67	25	41.67	5.5	2.98	3	5	17	28.33	40	66.67	7	2.85
9. The visual images and audio of the videos help me understand the vocabulary used better.	4	6.67	7	11.67	49	81.67	7.9	2.34	1	1.67	8	13.33	51	85	8.1	2.16
10. I feel more motivated to learn about the difficult vocabulary after I watched related YouTube videos.	8	13.33	24	40	28	46.67	5.8	3.02	3	5	24	40	33	55	6.3	3.01

answering the questionnaire. The findings of this study are consistent with those of Snyder and Burke (2008), who found that students use YouTube when learning literature as it enhances learning and helps them meet educational needs. Students also choose to use YouTube because it is easy to navigate (Snyder and Burke 2008). Khalid and Muhammad (2012) went as far as to say that YouTube can be more effective than the original text of the literature work itself when it comes to helping students understand the content of the literature. However, there are studies that disagree with the effectiveness of YouTube videos when learning literature. Yadav (2013) found that, although multimedia such as YouTube provide students with a system for improving the understanding of language, multimedia alone cannot assure a good learning and teaching environment. Tan and Pearce (2011), however, found that YouTube videos provide different points of view and opinions regarding a piece of a literature. The use of everyday examples in these videos also helps students relate to the literature work at hand, thus giving them a deeper insight and understanding into the meaning and content of the piece.

One finding that was not expected was that most of the participants were neutral towards the statements regarding the effectiveness of YouTube when it comes to sparking interest and motivation to learn literature. This is in contrast with findings from the study conducted by Burke et al. (2009), who found that YouTube encourages student engagement and sparks further interest in learning literature. It was also found that students who are not motivated to learn literature the traditional way are more motivated to learn when given real-life situations which are shown in the YouTube videos. The neutral attitude of students towards this can be explained by the lack of use of YouTube videos by lecturers in ADTP when teaching. These results in students being less exposed to YouTube videos when learning thus make them feeling more neutral towards the effectiveness of YouTube in motivating them to learn. The significant difference in the percentage of agreed statements in Part B of the questionnaire between the two groups of participants further confirms the role of YouTube as an effective tool for literature learning, with the experimental group showing generally higher percentages of agreed statements compared to the control group.

The biggest difference could be seen in the increase in the number of agreements of the seventh statement, "Practicing vocabulary using YouTube videos helps me learn more vocabulary," with a 21.67 % increase in the experimental group. This can be explained by a study conducted by Hu and Deng 2007, who found that one's vocabulary can be widened through the enhancement of word recognition ability under the conditions of multimedia environment. Other than that, the use of authentic and "everyday" English in the videos also helps students improve their vocabulary (Asgari and Mustapha 2011). YouTube videos also enhance conversation, listening, reading, and pronunciation skills and promote authentic vocabulary development for the students (Watkins and Wilkins 2011). However, Alimemaj (2010) found that the poor sound quality, pronunciation, and different street slangs featured in certain

YouTube videos may make it tougher instead for students to understand both the content of the video and the literature work. This problem can be solved with the use of annotations in the videos. Studies have shown that the effect of multimedia annotation on word retention is better than that of conventional print, with students being able to remember new words for a longer period of time when exposed to the annotations in videos (Hsieh n.d.). No participants had disagreed that their "vocabulary can be improved if the literary work is presented in an interesting way such as YouTube videos." Even in the control group who did not watch the YouTube video, 71.67 % of the participants agreed with that statement. Silverman and Hines (2009) found that the dynamic visuals, sounds, verbal definition, and static pictures present in the video may provide multiple means to acquire word knowledge. Besides that, Ahangari and Abdollahpour (2010) found out that students could remember words better after looking at visual images rather than just the plain text.

7 Limitations and Recommendations

This research involved 120 respondents who made up 24 % of the ADTP students. Results show limitations that include attitudes and preferences of students who have not had more than 10 years of experience in English learning, meaning that attitudes and preferences might have generated different results if the research were to be conducted among a different group of students with lesser exposure and experience in English learning. Visual images of the YouTube might not be the only thing that can attract students' interest and attention to learn English literature. It is recommended that further research should be conducted upon other students to probe further about the problem which could stem from different perspectives.

8 Conclusion

YouTube videos are an effective pedagogical tool in helping students understand and gain interest in literature learning. Results show that respondents gave affirmative feedback by showing high agreement percentages in the questionnaire that was aimed at probing the efficacy of YouTube videos and whether their vocabulary had improved by watching videos on YouTube. Interestingly, the feature that attracted the students most was the visual images that the video had that helped improve vocabulary acquisition which future research could be done to evaluate effects of different visual images that may alleviate factors such as learning style, prior knowledge, etc.

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An Empirical Study of Determinants of Teachers' Effectiveness in Higher Education Institutions in Pakistan

Muhammad Asif Khan

Abstract The study examined empirically the essential determinants of teachers' effectiveness in higher education institutions (HEIs) in Pakistan. Positivist paradigm had been adopted for the study. The design of the study was causal and cross sectional. The study was based on primary data collected through a structured questionnaire from 155 students studying in HEIs in Rawalpindi and Islamabad region. Descriptive, correlation, and regression analyses were used to analyse the data. The results of the study indicated that professional competence, subject matter expertise, classroom management, and feedback had positive and statistically significant effect on teachers' effectiveness. The study provided useful insight with regard to the essential predictors of teachers' effectiveness in HEIs. The results offered opportunities to the academicians, administrators, and regulators of HEIs to plan and implement appropriate interventions to enhance the teachers' effectiveness for desirable learning outcomes. The study also extended the existing knowledge of teachers' effectiveness in institutions of higher education in Pakistan.

Keywords Teachers' effectiveness • Determinants • Higher education • Pakistan

1 Introduction

In the new teaching and learning paradigm, higher education plays a significant role in the development of human capital, entrepreneurial ventures, and innovation for the sustainability of knowledge economy (Dill and Van Vught 2010). Altbach et al. (2009) affirmed that unparalleled transformation had taken place in scope and diversity of higher education during the last 50 years. The challenging and dynamic global marketplace and competitiveness demand a responsive society with proactive capability to develop, adapt, and use knowledge as the foundation for national

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growth in services and manufacturing sectors (Navarro et al. 2010; Johnson et al. 2012; Renzulli 1992; Romer 1990).

According to the prevalent trends, higher education is characterized by rapid growth, wider collaboration, appearance of strong employer-oriented nonuniversity sector, greater diversity, increasing progression and incorporation of new technologies, greater internalization, rising importance of market forces, and a fresh style of accountability, quality, and performance (The Teacher Effectiveness Measure Manual 2012; UNESCO 2014). In Asia, explosive growth has been witnessed in higher education. The rising demand for specialized human capital for societal economic and social development and the professed opportunities in subsequent life have accelerated the need for higher education (ADB 2011; Carnoy et al. 2012; World Bank 2012). Responding to these demands, the South Asian countries have undertaken initiatives that include expanding out and expanding up (increasing access and introducing new programmes compatible with the new paradigm) and addressing equity and equality issues in higher education (Kearney 2008).

1.1 Problem Statement

Teachers' effectiveness in higher education in Pakistan is a multifaceted challenge that is seriously affecting the desirable learning outcomes and impeding the achievement of stated knowledge objectives.

1.2 Purpose of the Study

The state of education in Pakistan has suffered immensely and needed major reforms to improve teachers' competence at all levels (HECP 2009; Iqbal 2000; Isani and Virk 2005). The Higher Education Commission of Pakistan (HECP) envisions assisting HEIs to become the engine of socio-economic development of the country (HECP 2003). HECP is pursuing a three-pronged strategy to deal with access, quality, and relevance of higher education in Pakistan. HECP envisages HEIs as catalyst for change. The role of teachers in these institutions is viewed as change agent. Faculty effectiveness is considered as the driving force for meaningful institutional and national development (HECP 2005). According to the Higher Education Medium Term Development Framework II, specialized faculty development programmes have been initiated compatible with the latest advancement in academic planning and management, pedagogy, testing, learners' psychology, communication, teaching practicum, and microteaching. Moreover, additional initiatives include provision of foreign and indigenous scholarships, establishment of continuous professional development centres, and promoting as well as rewarding research-related activities (HEC-MTDF 2011).

Within the context of higher education in Pakistan, performance and effectiveness of teachers had been studied from teachers' perspectives with focus on outcomes of training courses (Naveed et al. 2013) and quality of teachers' education (Aslam 2011; Dilshad 2010). However, no published research study related to Pakistan has been found that has evaluated teachers' effectiveness holistically as well as from students' perspective. There is, therefore, a need to objectively appraise this phenomenon from the most important stakeholder's perspective and find out the extent to which the learning outcomes are experienced by those who are directly affected by teachers' effectiveness. The present study fulfilled this gap and assessed teachers' effectiveness in HEIs in Pakistan, using important predictors of professional competence, subject matter expertise, candid and equitable feedback, and classroom management.

2 Literature Review

2.1 Teachers' Effectiveness

The emerging paradigm in education is characterized by growth in higher education, enhanced focus on students' learning objectives, introduction of novel pedagogical methodologies, and infusion of technology in pedagogy. The new environment has offered unique opportunities and challenges for improved teachers' effectiveness in higher education to achieve desirable learning outcomes at students, institutional, personal, and societal levels. Development theory articulated by Lucas et al. (2012a, b) advocated that teachers are essential constituent of developing creativity among students, both as role models and mentors. For this study, the teachers' effectiveness had been operationalized as the cognitive, emotional, and behavioural manifestation and development of students in academic and nonacademic activities, as well as achieving institutional goals.

Teacher's effectiveness is used in a wider context and entails teacher's competence, personal attributes, and behavioural manifestation that facilitate students to achieve the desired learning outcomes (Hundt 2009; Magno and Sembrano 2008). This argument was reinforced by Awofala (2012) that teacher's effectiveness involves attitude, knowledge, and performance. Researchers affirmed that teachers' competence is a major dimension of teacher's effectiveness (Anderson 2004). Institutional, students-related, and personal goal attainment are significant factors that influence teachers' effectiveness (Altbach 2009; Anderson 2004). Effective teachers facilitate their students in achieving cognitive, emotional, and balanced personality, critical thinking, problem-solving, and collaborative work to become effective citizens (Hundt 2009). This proposition was supported by The Teacher Effectiveness Measure Manual (2012) that teachers' effectiveness inspires students to become lifelong learners. The synthesis of literature found that student-centred philosophy, knowledge about subject, competence and enthusiasm about teaching, professional and effective approach in terms of classroom and behaviour manage-

ment, supporting communication, constructive feedback, relational orientation, desire for continuous improvement, fair treatment, and learning that promotes a challenging and stimulating context are essential dimensions of teachers' effectiveness (ADB 2012; Hativa et al. 2001; Minor et al. 2002; Alton-Lee 2003).

2.2 Professional Competence

The new paradigm in higher education has transformed from traditional teaching to vigorous meaning and construction of knowledge with focus on reflective inquiry and collaboration in teaching practice. This new paradigm has necessitated a change in discovering students' understanding, attitudes, and values and a shared approach to contextualize the world for mutual learning. Teachers in higher education are expected to promote students' creativity, innovative reasoning, approach of constructing knowledge, methodologies, and practice of self-directed learning enabling students to discover and apply learning in unknown situations (Cochran-Smith and Zeichner 2005; Conway et al. 2010; Schwille and Dembélé 2007). This study had used the tangible and intangible dimensions related to attitude, behaviour, personality attributes, and performance of teachers during the course of their interaction with students with a focus on desirable learning outcomes.

Professional competence is a holistic concept and has a wide scope that includes metacognitive, motivational, and self-regulatory traits, which attribute to educational performance (Feiman-Nemser 2008; González and Wagenaar 2005; Kelley et al. 2002; Williamson-McDiarmid and Bright 2008). This contention was supported by researchers who added that intellectual abilities, content-specific knowledge, cognitive skills, pedagogical strategies, personal values, motivational tendencies, and social behaviour are essential dimensions of teachers' professional competence (Connell et al. 2003; Weinert 2001a, b). Researchers found this capability as learnable and teachable (Klieme et al. 2008; Weinert 2001a). Scholars and researchers at international level have consensus that competence is expressed in craft skills, knowledge, and dispositions (Feiman-Nemser 2008; González and Wagenaar 2005; Kelley et al. 2002; Williamson McDiarmid and Bright 2008). They argued that such approach to competence focuses on prospects of continuous achievement and development in a life learning paradigm. Ample literature supports the proposition that professional competence of teachers significantly contributes towards teachers' effectiveness (Conway and Clark 2003; Cochran et al. 2005; González and Wagenaar 2005; Kelley et al. 2002; Kennedy et al. 2008; Feiman-Nemser 2008). The researchers, however, emphasized the need to validate this hypothesis in different contexts since cultural values play a significant role in the formulation of attitude and behaviour of teachers that significantly affect their interaction with students in academic environment and may, therefore, influence teachers' effectiveness differently (Kelley et al. 2002; Kennedy et al. 2008).

2.3 Subject Matter Expertise

According to cognitive psychology, knowledge is an essential aspect of mental activity (Anderson 2004). Researchers have agreed that knowledge is at the heart of teachers' understanding and analysis, acuity, and illustration of classroom situations, belief about teaching activity, and performance in classroom (OECD 2012; Klieme et al. 2008). The literature identified the scope of professional knowledge in three categories based on Shulman's landmark study on teachers' education (Baumert et al. 2010; Shulman 1986, 1987). This included content knowledge, pedagogical content knowledge, and pedagogical knowledge and constituted essential contributor to teachers' effectiveness (Baumert et al. 2010). In this study, the variable had been operationalized as teachers' abilities about content knowledge, pedagogical content knowledge, and integration of cultural, societal, and global issues in the subject matter.

Teachers' knowledge has transformed into a broader scope over the last few decades. According to Shulman (1987), the main focus of teachers' knowledge had been on teaching subject matter using appropriate pedagogical approaches. Some researchers supported the integration of teachers' personal, professional, and general knowledge (Holden and Hicks 2007). Tang (2003) identified the need to enhance its scope and proposed to include the context in the knowledge domain. The effects of globalization were viewed as a significant contributor to changes in curriculum and hence Holden and Hicks (2007) recommended including multiculturalism and global issues in the knowledge sphere. As societal issues became more distinct, therefore, Gorski (2009) highlighted the need to include societal issues in the teachers' knowledge to make it more pragmatic. Although there is an agreement that knowledge is the essential component of teachers' effectiveness, however, there has been a debate in the literature with regard to the nature of knowledge that is critical to teachers' performance. Some studies have identified that teachers' expertise in the subject matter is based on formal training, milieu of teaching setting, cultural difference, tacit, and personal as well as practical knowledge (Goldhaber 2006; Gorski 2009). Extant literature manifests that subject matter knowledge of teachers has been found to be a significant predictor of teachers' effectiveness. These studies have, however, identified the need to validate this proposition in different culture for generalization (Abell 2007; Holden and Hicks 2007; Gorski 2009).

2.4 Classroom Management

Classroom management entails teachers' endeavours to supervise the actions of classroom that include students' behaviour, social interaction, and learning (Nelsen 2006). Classroom management entails a wide range of mechanism affecting the tangible physical atmosphere and intangible dimensions based on relationship

during learning process. The scope of classroom management is not restricted to systems and environment. It harmonizes a fragile order through patience, personal style, and planning on the part of the teacher. Effective classroom management embraces purposeful management of activities, behaviour, and space in the classroom (Evertson and Weinstein 2006; Gay 2002, 2010). This phenomenon needs to be dynamic and decisive for creating desirable learning environment for academic and social gains (Martin et al. 2006). The study had operationalized the variable as a pragmatic approach by teachers to effectively develop student-centred learning environment and meaningful personal development.

The earlier focus of classroom management had been on behavioural modification through punitive strategies.

This approach did not advance students' creativity, growth, and reflection (Bear et al. 2005). The new paradigm of classroom management focused on a collaborative approach to create a supportive learning environment for meaningful students' engagement and desirable learning outcomes (Mehra 2004). Gay (2000, 2005) advocated the concept of culturally responsive teaching to respond to changing demographics and unique needs of diverse students. Weinstein et al. (2004) further stressed the need for culturally responsive classroom management with focus on social decision-making, importance of self-regulation, and community building. Brown (2003, 2004) augmented and presented strategies to promote culturally responsive classroom management. These strategies included developing compassionate communities, creating business-focused environment, and promoting harmonious communication procedures, clearly stipulated teaching goals, and assertive approach to teaching. Weinstein (2004) supported five essential dimensions of culturally responsive classroom. These included understanding of students' background, the wider milieu of educational system, recognizing one's own biases, pledge to develop caring classroom groups, and motivation and ability to use suitable classroom management strategies to foster cultural cohesion. It is emphasized that such environment makes students' personally responsible for peer acceptance.

Researchers have agreed that effective and culturally responsive classroom strategies are important for learning outcomes (Littky 2004; Kesici 2008). These strategies include understating of individual needs of students, assertive discourse, sharing expected behaviour, students collaboration, structured routine, manifestation of respect and care, teachers visibility and availability during and after classes, and constructive feedback, encouragement, and recognition. The researchers found strong evidence that effective classroom management significantly contributes towards teachers' effectiveness (Norris 2003; Littky 2004; Kesici 2008). The researchers, however, indicated that cultural dynamics need to be studied to establish the impact of culturally responsive classroom. In societies with diverse cultural orientation, the effects of classroom management on teachers' effectiveness need to be further explored to corroborate this premise (Kesici 2008; Weinstein et al. 2004).

2.5 Feedback

The feedback has its roots in the learning theory supported by Race (2001). Experimental learning forms the basis of this theory. Researchers promoted this phenomenon through empirical evidence and found relationship of feedback with self-efficacy of students (Chan and Lam 2010) and association feedback with corrective learning (Bitchener 2008). According to social cognitive theory, an interface with the environment strongly influences individual behaviour (Sampson et al. 2010). Feedback is an essential aspect of social persuasion that includes communication in the form of comments, compliments, statements, and criticism about individual competence that he or she experiences during social interaction with others. Such interface positively affects self-efficacy of individuals (Timperley 2007). Researchers have consensus that feedback is some specific information; its purpose is to identify the gap between the actual performance and the reference level of performance, and it facilitates students in modifying the behaviour with a view to fulfil the gap to achieve the overall superior academic performance and learning outcomes (Hattie and Timperley 2007; De Kleijn 2013). Strong support is available in literature that effective feedback is goal related, goal specific, and learning enhancing (Alder 2007; Duijnhouwer 2010; Shute 2008). This study had operationalized feedback as proactive and goal-oriented discourse by teachers to identify the gaps in the performance of students and collaboratively work with students to initiate and sustain continuous improvement.

Researchers have identified formative feedback and summative feedback as two important types (Higgins et al. 2010; Shute 2008). Formative feedback provides requisite direction to students to achieve specific goals through critical thinking, behaviour modification, and improvement in knowledge and skills (Irons 2008; Shute 2008). Summative feedback relates to the time when students are not in a position to take any corrective action to enhance their performance. This usually happens during the final assessment of the performance of students (McAlpine 2004).

Teachers use multiple approaches to provide feedback to students. These included oral feedback, self-assessment, peer feedback, written feedback, feedback using information technology devices, and face-to-face feedback (Higgins et al. 2010; Dewald 2000; Guardado and Shi 2007; Meerah and Halim 2011). Students welcome and found face-to-face and written feedback from teachers as satisfying and productive, since these provided them prospects of becoming aware of their weaknesses and facilitated in planning appropriate interventions to improve performance (Laryea 2013).

Researchers found positive and significant effects of feedback on students' motivation, self-efficacy, academic achievement, behavioural and learning outcomes, civic and societal engagement, and relational engagement (Chan and Lam 2010; Hattie and Timperley 2007; Race 2001; Schartel 2012). Studies have found that creative feedback increased students' competence (Chan and Lam 2010), whereas negative feedback significantly affected students' psychological disengagement

(Strambler and Weinstein 2010). The researchers, however, identified the need to further investigate the effects of feedback in emerging economies having diverse cultural values to substantiate this premise (Race 2001; Chan and Lam 2010).

3 Methodology

This was a quantitative and causal study. Using structured questionnaire and convenience sampling technique, the data was collected from 155 students from 20 universities, from public and private sectors, in Islamabad and Rawalpindi region. This area is the nucleus of universities, and approximately one fourth of the universities in Pakistan have their campuses located in this area. This provides a diverse population of students for the study. The instrument was adapted from studies of different researches (Bustos-Orosa 2008; Lacang 2007; Mango and Sembrano 2008; Minor et al. 2007; Reyes 2000; Sanchez 2007; Restubog 2009; Glen 2013). Content validity was ensured as recommended by experts (Leech et al. 2005; Nunnally 1978; Sekaran 2000). The instrument indicated desirable reliability during pilot testing and the main study (Nunnally 1978). The reliability of 41 items instrument was 0.924. The reliability of teachers' effectiveness (6 items), professional competence (9 items), subject matter expertise (10 items), classroom management (11 items), and feedback (5 items) is shown in Table 1.

4 Results

Descriptive statistics, correlation, and regression analyses were used to evaluate the data. Statistical Package for Social Sciences (SPSS 20) software was used to analyse the data. The results of descriptive statistics in Table 1 reflect general agreement of the respondents with regard to the variables of the study.

Results of correlation in Table 2 reflected positive and statistically significant correlation among all variables. The results of regression analysis in Table 3 indicated that professional competence, subject matter expertise, classroom management,

Table 1 Descriptive statistics and reliability

Variables	Mean	Standard deviation	Cronbach's alpha	Skewness	Kurtosis
Teachers' effectiveness	3.78	.737	.865	.807	.387
Professional competence	3.93	.529	.790	.404	.401
Subject matter expertise	3.78	.550	.780	.114	.203
Classroom management	3.80	.527	.806	.375	.275
Feedback	3.65	.737	.716	.870	.303

$N = 155$

Table 2 Correlation matrix

Variables	PC	SME	CRM	FB
PC				
SME	.635**			
CRM 0.580[a]	.544**			
FB	.486**	.585**	.491**	
TE	.581**	.544**	.549**	.507**

PC professional competence, *SME* subject matter expertise, *CRM* classroom management, *FB* feedback, *TE* teachers' effectiveness
**Correlation is significant at $p < 0.01$ (two-tailed)

Table 3 Regression analysis

Predictor	Proposed effects	Path coefficient	Observed *t*-value	Sig. level
PC	+	.253	2.981	.003
SME	+	.174	2.100	.038
CRM	+	.212	2.675	.008
FB	+	.196	2.673	.008

Criterion variable: teachers' effectiveness
Predictors: *PC* professional competence, *SME* subject matter expertise, *CRM* classroom management (CRM), *FB* feedback
$N = 155$, R-square, .457, F-statistics = 31.583, p-value < .000

and feedback by teachers positively and significantly predicted teachers' effectiveness. The results support the hypotheses of the study. Professional competence had the maximum contribution towards teachers' effectiveness followed by classroom management.

5 Discussion and Conclusion

The study provided useful insight relating to essential factors that contribute towards teachers' effectiveness in HEIs in Pakistan. The results indicated positive and statistically significant empirical evidence of drivers of teachers' effectiveness to realize the learning objectives within the context of higher education in Pakistan. Effective management of these factors would significantly contribute in achieving the desired goals of higher education effectiveness in Pakistan.

The changing paradigm has transformed the expectations from higher education, especially in developing economies like Pakistan. These expectations constitute integrating diverse students' needs, teaching in multicultural classrooms, technology adoption and effective usage, active participation in academic activities and governance of institutions, and collaboration with stakeholders (OECD 2009). The World Summit on Teaching emphasized that teachers need to help students in developing critical thinking, creativity, problem-solving, decision-making and learning,

developing modes of collaboration, using technology, fostering citizenship, and encouraging contribution towards society (OECD 2011). Teachers play a major role in shaping students' behaviour, affecting educational processes, and realizing educational objectives (David and Macayanan 2010). Teaching in higher education is a specialized skill that not only needs expertise in requisite academic field but also requires competence to create enabling learning environment to achieve learning outcomes (Tan de-Ramos 2011).

Teachers' professional competence is multidimensional in nature and is based on explicit and tacit knowledge; practical and cognitive skills, beliefs, value orientations, and emotions as well as motivation (Rychen and Salganik 2003); empowerment to act professionally in different contexts (Koster and Dengerink 2008); and meeting complex demands of work efficiently and effectively using psychosocial possessions (González and Wagenaar 2005). The prevalence of uncertain environment necessitates adaptive expertise (Vogt and Rogalla 2009). The need to have a sound pedagogical content knowledge is vital for students' learning. Teachers need to be rationally and morally sound and successful in achieving learning outcomes (Hill et al. 2005). Research, interpersonal, and reflective skills are essential aspects of competence at higher education level. Teachers are expected to have requisite attitude to critically evaluate their teaching practice, through collaboration with stakeholders, with a view to identify areas for continuous improvement in cognitive, affective, and social attributes (Cochran-Smith and Lytle 2009). The professional competence of teachers in higher education is critical in achieving learning outcomes and significantly influences teachers' effectiveness (Kennedy et al. 2008).

Teachers' expertise in the subject matter facilitates them in choosing appropriate pedagogical strategies for students' learning. This expertise manifests in dealing with difficult questions by students in the classroom. In addition, it helps in establishing supportive relationship and leads to enhanced breadth of subject matter for effective implementation of the curriculum and achieving learning objectives (Goldhaber 2006). The scope of the subject matter has been extended to include global, cultural, and societal issues that need to be integrated in the academic discourse with students. A meaningful association of knowledge with reality provides students with a sense of purpose and fosters their commitment to make positive contribution in all activities that yield constructive outcomes for the community and society (Kesici 2008).

Structured and culturally responsive classroom management is essential for positive gains. This manifests in creating freedom, fairness, and equality in the classroom, understanding the responsibilities of teachers and students, and possessing and demonstrating core values and positive discipline by teachers with the focus on realizing learning objectives (Nelsen 2006). Feedback to students improves passion and self-awareness for learning, helps students in making learning meaningful and prolific, assists students in realizing their weaknesses, and inspires them to take appropriate remedial measures to improve their performance. Students value good feedback from teachers (Chan and Lam 2010; Schartel 2012).

Feedback to students about their academic performance leverages superior performance. A shared philosophy and collaborative approach are vital through

continuous interface with students (Parayitam 2007). This proactive mechanism provides opportunity to students to objectively evaluate their performance. Realization of performance fosters motivation among students to initiate directed and self-regulatory approaches to achieve high quality performance in academic and nonacademic activities (Shute 2008). The role of teachers is vital in providing free and goal-directed feedback and a collaborative approach to plan actions to improve the performance of students. Teachers are expected to create an accommodating environment and provide emotional and intellectual support to students to meet the emerging challenges (Meerah and Halim 2011). Comprehensive, consistent, timely, equitable, and trustworthy feedback from teachers are highly valued by students, and this enhances mutual trust. Constructive feedback significantly affects students and institutional learning objectives (Sampson et al. 2010; Schartel 2012).

The empirical evidence provided by this study concurs with the results of earlier studies that teachers' professional competence, subject matter expertise, effective classroom management, and constructive and timely feedback are significant contributors of teachers' effectiveness in higher education institution (Bransford et al. 2005; Carless 2006; Marzano 2001; OECD 2009; Schwille and Dembélé 2007; Shulman 1986, 1987; Tauber 2007; UNESCO 2014).

5.1 Managerial Implications and Future Study

The study provided incisive insight into the phenomenon of teachers' effectiveness within the context of higher education in Pakistan. In the changing paradigm, higher education in Pakistan is facing complex problems with regard to teachers' development and effectiveness to realize strategic objectives. The results offered an opportunity to academicians, administrators of HEIs, faculty members, and regulators to plan proactive interventions for enhancing teachers' effectiveness using multifaceted approaches. The focus in this direction needs to be on sustained efforts for strategic gains in transforming teaching to realize national educational objectives. The study is limited to the teacher-specific factors that determine teachers' effectiveness. Future studies need to extend the scope to include organizational- and student-related factors and explore their effects on teachers' effectiveness. Moreover, future research may opt for a longitudinal approach to study this phenomenon.

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The Impact of Holistic Education Approaches on First-Year Experience of Business Undergraduates: Promoting Interactive and Creative Learning Environments

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Abstract It is becoming increasingly difficult to ignore that the foundation of student success at university begins with a holistic and positive first-year experience (FYE). Existing literature provides ample evidence to indicate that there is a need for institutions of higher learning to undertake holistic and well-defined approaches that will successfully support the social, personal and academic needs of a diverse student population. These support mechanisms are especially crucial during the early weeks of the students' first year, as it is intended to enhance their learning engagement and learning experience by providing a holistic first-year education that will ensure the retention of commencing students and increase the likelihood of degree completion. This study examines the impact of holistic education approaches on the learning experience of first-year business students. The conceptual framework for this study is based on a wide array of theory, including the work of Lizzio (2006) on the five 'senses of success'. The study uses a specially designed questionnaire to elicit information pertaining to the factors impacting the first-year experience. The results of this study indicate that students appreciate the empowerment efforts of the faculty, which enhanced their first-year experience. It was found that the academics teaching the first-year business programmes utilized active teaching and learning methods, promoting interactive and creative learning environments that positively impacted on the students' learning experience, and successfully supported their social, personal and academic needs. These methods included blended learning techniques and the use of X-Space classrooms, various hands-on projects (Fresh Mart, study trips, group assessments) and other student-centred activities and support mechanisms (support classes and orientation programmes). It is hoped that the findings of this study will provide institutions of higher learning a set of considerations for devising educational policies and practices that will successfully enhance students' first-year experience (FYE).

Keywords First-year experience • Learning experience • Holistic education • Student-centred

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1 Introduction

This study launched an investigation into an important higher education topic intent on broadening the body of knowledge concerning the first-year experience of undergraduates. One of the most significant areas of research in enhancing the undergraduates' quality of learning and their first-year experience is related to the students' learning styles and their approach to learning (Watkins 1982; Biggs 1987; Ramsden 1988; Regan and Regan 1995; Zeegers 1999). Learning, according to the educational theory of constructivism, is an active process that involves the mental construction of knowledge which is unique to every individual, no matter how one is taught. Bransford et al. (2000) highlight the need for learning to be closely linked to experience and to the contexts of experience one undergoes, irrespective of how or where learning takes place. There is a general consensus among several authors (Poikela and Poikela 1997; Neill 2007; Norman et al. 2008) that graduates in today's world are expected to be able to deal with complex problems in an efficient way.

The first year at university is a unique and extremely challenging period for many undergraduates, who come from diverse backgrounds and social settings. Having undergone varying educational settings in their primary and secondary schools, the learning approach of these newly commencing students may not suit the university's educational settings, thus warranting a more focused research as to what helps and what hinders their learning. It is under this premise that the current study was carried out. This study examines the holistic approach to higher education that is believed to impact the learning experience of first-year students in a business programme of a private university in Malaysia. The conceptual framework for this study is based on a wide array of theories, including the work of Lizzio (2006) on the five 'senses of success'. The instrument used in this study is a specially designed questionnaire that is hoped to elicit information pertaining to the factors impacting the business undergraduates' first-year experience.

The study seeks to find answers to the following questions:

1. What are the antecedents affecting the learning experience of first-year business students?
2. Do lessons outside the classroom, peer support, assessments and feedback, blended learning and the use of the X-Space collaborative classroom and social media have an impact on the learning experience of first-year business students?
3. Does the learning experience of first-year business students have an impact on their graduate capabilities or skills?

The main aim of the study is to confirm or reject the following hypotheses:

Hypothesis 1: Out-of-classroom lessons positively and directly influence students' learning experience.

Hypothesis 2: Peer support positively and directly influences students' learning experience.

Hypothesis 3: Assessments and feedback positively and directly influence students' learning experience.
Hypothesis 4: X-Space and blended learning positively and directly influence students' learning experience.
Hypothesis 5: Social media positively and directly influence students' learning experience.

The study is organized as follows. Firstly, the literature review is briefly discussed. The next section describes the data and methodology, and this is followed by a discussion and analysis of the findings. The final section concludes.

2 Literature Review

There is a wide variety of differing approaches to describing the ways in which students learn in higher education. Each student's approach to learning varies as it depends heavily on individual students' innate attributes, their prior knowledge and learning experience and their perceptions of courses, teaching and assessment procedures. For the newly commencing students, their approach to learning transforms as they go through a rather challenging transition period, from high school to university.

Lizzio (2006) proposed the 'five senses of success' that are deemed relevant for the early success of newly commencing students at a university. Students' success at the university according to Lizzio (2006) depends on their sense of capability, sense of connectedness, sense of purpose, sense of resourcefulness and their sense of academic culture. His 'five senses of success' framework explains what is needed to ensure that the students' approach to learning suits the university setting (viz., 'learning ready') and smoothens the transition into the university for the first-year students.

With the democratization of higher education, universities face unprecedented challenges, as they face stiff competition in higher education from other domestic and international universities. These challenges include declining enrolment, increasing attrition numbers, weakening retention numbers, financial sustainability, the need to improve ratings and reputation to be the university of choice. The attrition and retention challenges are more apparent in the first year compared to the other years, and as such, the need for a comprehensive, long-term strategic development aimed at improving first-year student engagement and retention has never been more urgent (Burnett and Stephen 2011).

In recent years, there has been an increasing amount of literature on first-year experience (Yorke and Thomas 2003; Kift 2008; Tinto 2002, 2009; Leese 2010), emphasizing on the need for comprehensive and inclusive strategies to smoothen first-year student transition and to enhance their sense of connection and engagement, in an effort to improve their undergraduate experience and to ensure a higher probability of completing their studies (viz., 'degree completion').

One of the main strategies that many universities focused on was in unlocking their curriculum, as 'the curriculum should enact an engaging and involving curriculum pedagogy and should enable active and collaborative learning' (Kift 2009, p. 41). For example, when setting assessments and marking criteria, a more inclusive approach must be carried out. When students are more active participants in the assessment and feedback process, this feedback has a more meaningful impact on the students' learning (Hattie and Timperley 2007; Duncan 2007; Crisp 2007; Nicol and Draper 2008).

Unlocking and transforming the curriculum to engage students in a meaningful learning process can also take place with pedagogy that extends its learning environments out of classrooms by way of mobility trips, community outreach programmes, internships and national and international competitions, in an effort to manifest students' agency in an out-of-classroom setting. There have been several studies in the literature on students' agency (Watson et al. 2002; Mortensen and Smart 2007; Dewitt and Hohenstein 2010) reporting that lessons or activities out-of-classroom allow for meaningful learning and interaction to take place.

Technology-infused pedagogy is becoming a more prominent feature of university curriculum. Blended learning provides a creative and interactive environment for flexible learning to accommodate the diverse needs of the current students. The benefits of blended learning include the availability of the latest information; fast, easy and timely access to a wide range of resources and the opportunity for the learner to work at their own pace (Sandars and Langlois 2005); availability of more timely and consistent content (Liaw et al. 2007) and the opportunity for the students to learn anytime, anywhere, providing them with a platform to recapture their lessons leading to an increased retention and a stronger grasp on the subject and allowing learning to take place for a large groups of students (Cantoni et al. 2004).

Studies carried out on the use of social media for educational purposes have provided ample evidence of the benefits of using social media in promoting critical thinking among students (Mason 2006), in enhancing students learning experience (Piriyasilpa 2010), in transforming students from passive learners to active and intentional learners (Ziegler 2007) and in providing a collaborative platform to learning and teaching, allowing increased peer interaction as well as interaction between the educator and the students (Collins and Halverson 2010; Wodzicki et al. 2012). In a study by Rasiah (2014), the use of social media for educative purposes was '*perceived as an innovative and effective tool in a student-centered learning environment that enriched students' educational experiences, increasing the relevance of the subject matter and encouraging students to collaborate effectively with their peers and faculty*'.

Based on the cursory literature review above, it is evident that many factors affect students' learning experience, especially that of the first-year students. It is therefore essential to continuously embark on research to elicit meaningful evidences on the various factors that can enhance students' learning experience, to enable institutions of higher education to implement comprehensive first-year strategies

that will lessen the burden and challenges faced by the newly commencing students and to help alleviate the retention and attrition problems that many universities currently face.

3 Research Methodology

3.1 Data Collection

The data was collected based on an online survey of 146 first-year business undergraduate students in a private institution of higher education to elicit information with regard to their perception of the factors that helped or hindered their first-year learning experience. The questionnaire utilizes a 1–5 Likert scale format to measure the extent to which the students perceived the impact that these factors had on their learning experience and in developing their graduate attributes (represented by TGCs 1–8 as per Fig. 1).

3.2 Conceptual Framework

The conceptual framework employed in this study is illustrated in Fig. 1. The explanatory variables represent the antecedents believed to impact upon students' learning experience. The impact of students' learning experience on their skills development is also explored.

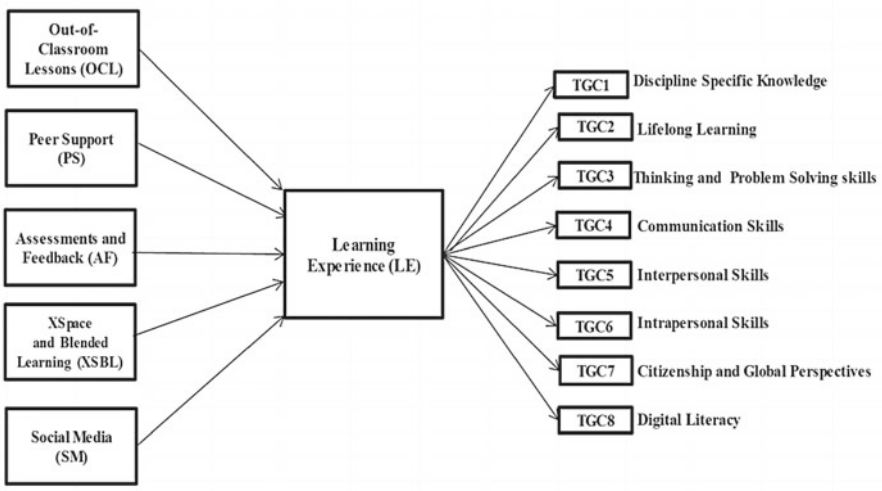

Fig. 1 Conceptual framework

4 Discussion and Analysis

4.1 Respondents' Demographics

There were a total of 146 respondents of which 42.1 % were males and 57.9 % were females. The respondents were diverse in ethnicity, with the majority being Chinese (66.2 %), followed by Malays (15.9 %) and Indians (6.9 %) and a handful of other ethnic groups.

The respondents' pursued different programmes, with the majority coming from the Accounting and Finance (37.2 %) as well as the International Business and Marketing Programmes (33.1 %).

4.2 Factor Analysis (Summary) and Reliability (Cronbach's Alpha)

Table 1 provides a summary of the results of a series of factor analysis conducted on the various sections of questions in the survey. Six constructs emerged as shown in Table 1. The respondents' learning experience was measured by 17 items which remained after factor analysis was conducted. This construct is reliable as its Cronbach's alpha value is 0.954, which is well above the minimum requirement of 0.7 (as per Nunnally 1978), suggesting that the items within this construct have relatively high internal consistency/reliability. The KMO value from the factor analysis was 0.937, indicating a good level of data reduction adequacy.

The remaining constructs which make up the explanatory variables in our study comprise of out-of-classroom lessons (measured by six items), peer support (measured by eight items), assessment and feedback (measured by eight items), X-Space and blended learning (measured by ten items) and the social media (measured by

Table 1 Factor analysis summary

Construct name	KMO	Bartlett's test of sphericity (approx chi-square)	Number of items	Total variance explained	Reliability (Cronbach's alpha)
Learning experience	0.937	1.778E3***	17	58.278	0.954
Out-of-classroom lessons (OCL)	0.889	592.675***	6	71.814	0.920
Peer support (PS)	0.912	815.707***	8	66.468	0.926
Assessment and feedback (AF)	0.881	677.616***	8	61.317	0.908
X-Space and blended learning (XSBL)	0.957	1.457E3***	10	75.051	0.962
Social media (SM)	0.908	786.275***	6	79.066	0.947

The asterisks *** indicate the rejection of null hypothesis at 1 % significance level

six items) constructs. The Cronbach's alpha values for these constructs are 0.920, 0.926, 0.908, 0.962 and 0.947, respectively, which were, once again, well above the minimum requirement of 0.7 (as per Nunally 1978), suggesting that the items within the constructs have relatively high internal consistency. The KMO values from the factor analysis for all the constructs indicated a good level of data reduction adequacy.

All items in the individual constructs were found to be adequately correlated as their highest absolute correlation fell between 0.35 and 0.85 as per Cohen's criteria (1989) that posits that two variables or items are said to be associated if their correlation coefficient value is at least 0.35. Therefore, it can safely be said that every item in the respective constructs correlated adequately with at least one other item within their own constructs. (The detailed correlation coefficients are not shown due to limited space. Please contact the author for full details.)

4.3 Multiple Linear Regression Analyses

Multiple linear regressions analyses were carried out with various combinations of dependent and independent variables to demonstrate the factors that help explain students' learning experience and the skills they develop or enhance. The results in Table 2 indicate the existence of a positive and significant relationship between the students' learning experience and four out of five of its explanatory variables.

The empirical evidence shows that the first-year students' learning experience is impacted positively by out-of-classroom lessons, peer support, assessments and feedback and also by the use of X-Space collaborative classroom and blended learning. These findings concur with those found by Hattie and Timperley (2007) and Nicol and Draper (2008) for assessments and feedback; Cantoni et al. (2004) for blended learning and Dewitt and Hohenstein (2010) for out-of-classroom lessons.

The results show evidence that assessments and feedback have the greatest impact on students' learning, showcasing the importance of ensuring good assessments, and effective and timely feedback are given to promote deep and meaningful

Table 2 Multiple linear regression analysis predicting learning experience as a function of lessons outside the classroom, peer support, assessment and feedback, X-Space and blended learning and social media

Country	OCL	PS	AF	XSBL	SM
Learning experience	0.192***	0.226***	0.314***	0.246***	0.074
	[3.393]	[4.156]	[5.234]	[3.575]	[1.146]
Adj $R^2 = 0.775$; F-stat = 100.76***					

Learning Experience$_i = \beta_0 + \beta_1 OCLi + \beta_2$ PS$_i + \beta_3$ AF$_i + \beta_4$ XSBL$_i + \beta_5$ SM$_i$
The asterisks *** indicate the rejection of null hypothesis at 1 % significance level

learning among students as supported by the findings of Hattie and Timperley (2007), Duncan (2007), Crisp (2007) and Nicol and Draper (2008), among others.

Surprisingly, social media did not have a significant impact on the learning experience of the first-year students, contradicting the findings of Piriyasilpa (2010), Wodzicki et al. (2012) and Rasiah (2014).

The study further found evidence of how graduate capabilities or skills are developed or enhanced among first-year students. Table 3 shows the multiple linear regression (MLR) results of the impact of the students' overall learning experience on each TGCs or skills.

It can be seen from the results in Table 3 that the graduate capabilities or skills that were significantly enhanced or developed based on the respondents' learning experience were, in the order of importance, digital literacy, discipline-specific knowledge, communication and intrapersonal skills.

The digital literacy skill was the most impacted, as there was heavy emphasis on the need to incorporate blended learning as a major transformational strategy of the university in its effort to remain competitive and to address the profound changes that were taking place in the educational landscape in the country. The emphasis on digital literacy was far-sighted as the university believed in providing and promoting interactive and creative learning environments that would bring meaning to learning, especially to the current generation of students.

As far as discipline-specific knowledge and communication skills were concerned, as this involved the first-year semester one students, it was only natural that the curriculum emphasized more on initially building the content and communication skills and progressively shifting the emphasis on the higher-order cognitive skills of critical thinking and problem-solving, lifelong learning and citizenship and global perspective skills in the Years 2 and 3. The results also showed that the students'

Table 3 Multiple regression analyses predicting the impact of the students' learning experience on each specific Taylor's graduate capability

Dependent variable	Explanatory variables	Unstandardized coefficients	Adj R^2	F-stat
Discipline-specific knowledge (TGC1)	Learning experience	0.525***	0.516	154.31***
Lifelong learning (TGC2)	Learning experience	0.423***	0.448	117.92***
Thinking and problem-solving skill (TGC3)	Learning experience	0.445***	0.460	120.91***
Communication skill (TGC4)	Learning experience	0.451***	0.351	78.89***
Interpersonal skill (TGC5)	Learning experience	0.449***	0.400	97.01***
Intrapersonal skill (TGC6)	Learning experience	0.451***	0.490	139.29***
Citizenship and global perspective (TGC7)	Learning experience	0.429***	0.343	76.28***
Digital literacy (TGC8)	Learning experience	0.549***	0.407	99.73***

The asterisks *** indicate the rejection of null hypothesis at 1 % significance level

learning experience impacted on their intrapersonal skills, as the Business School put much emphasis on reflective learning, with the intention of developing self-reliant and reflective business graduates who would embody Taylor's core values in all their undertakings.

5 Conclusion

There are many factors that impact first-year learning experience. This study found meaningful evidences that showed how assessments and feedback, as well as technology-enhanced learning, via the X-Space collaborative classroom and blended learning, played an important role in establishing building blocks and safety nets that allowed first-year students to learn in a secure and nonthreatening environment. The implication of this study is that institutions of higher learning take heed in understanding the needs and concerns of their newly commencing students, so as to design and implement effective and inclusive FYE strategies that will smoothen their transition into university life and ensure their degree completion, giving particular attention on the setting of effective assessment and feedback mechanisms and utilizing technology-enhanced learning to create an impactful first-year learning experience. Even though there isn't 'one right way' to design an FYE and transition strategy, it is however important that we reflect and put on our thinking caps to design and implement effective and inclusive FYE strategies. As Lizzio (2006) aptly puts it, '*… there aren't any guaranteed solutions or* "*magic bullets*" *that will impact on student retention or engagement. A reading of the available literature does however indicate that there are consistent needs and concern that students experience as they commence university*', and it is our duty to ensure these needs and concerns are addressed.

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Learning Enhancement Through Blended Learning Environment via Learning Management System, Social Learning Platform and Video: A Case Study at Taylor's University

Tee Wee Jing, Sharon Lim Pui Voon, Sarojini Devi Nagappan, and Wong Seng Yue

Abstract This study aims to enhance learning effectiveness and student satisfaction with blended learning environment. Specifically, we propose a blended learning model using learning management system, social learning platform and video. We implemented this blended learning model for two consecutive semesters for RMIT Degree Programs at School of Computing and IT, Taylor's University. This study also explores theoretical and design principles and how information technology can potentially support to meet these principles. The research methodology we used is quantitative approach which includes Course Experience Survey and academic results. The outcome of this research indicates that this blended learning model increases the students' interest, which in turn enhances their academic achievement in the studies.

Keywords Blended learning • Learning management system • Social learning platform • Video

1 Introduction

Our world today is in the golden age of technological innovation, where our daily lives are integrating and synergising with digital technologies. In the field of education, the advancement of technology is opening up various possible solutions in the field of learning and teaching. The current and future trend of learning environment is a combination of face-to-face teaching and learning with e-learning.

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The challenge today for educators is to design an effective blended learning environment using state-of-the-art technologies in order to enhance learning experience and achieve better educational outcomes.

2 Literature Review

Blended learning is defined as a course learning and teaching methodology that combines face-to-face instruction with online learning (de Leng et al. 2010). In blended learning, online learning is integrated with face-to-face instruction in order to create a more effective and engaging learning and teaching experience for both students and lecturers. Online learning is further categorised to synchronous and asynchronous mode. Some research (So and Brush 2008) claimed that blended learning is effective and efficient in facilitating collaborative learning among students. On top of this, collaborative learning can be further improved by using appropriate technological platform, like social learning platform, with systematic learning activities in order to let students in the group do self-reflection and peer review on their respective work (Liao 2006). Some research (Liang 2010; Warschauer 1996) suggested online peer communication as an alternative option to face-to-face communication, because current generations of students are digital natives and tech-savvy. Online communication and collaboration can increase students' motivation, participation and collaboration.

We need to consider various theoretical and practical issues which include real-world constraints when designing and implementing a blended learning environment. While conceptualising and designing a learning environment, it is of utmost important to first examine the theory of how people learn. From a constructivist perspective, "learning is a process of making sense of the world and negotiating the meaning with others in order to resolve uncertainty and to attain viability of one's own understanding" (Duffy and Cunningham 1996; von Glasersfeld 1995). In order to facilitate this theory to put into real-world practice, some researches (Savery and Duffy 1996) provide the seven constructivist principles of instructional design. These seven principles can be used as design guidelines for a constructivist blended learning environment that will support learners to develop strong domain expertise and also complex problem-solving skills.

In another aspect, the instructional design principles can lead to a wide variety of learning environments. Further researches in the field of cognitive (Mayer 2001; Paas et al. 2003) suggested that instructional support can be implemented in order to overcome the limitations of the human cognitive architecture. When designing a blended learning environment, we should take into consideration the two structures in human which are regarded crucial for the processing of information, i.e. working memory and long-term memory (Paas et al. 2003; Kintsch 1998). Different types of synchronous and asynchronous online learning should be taken into consideration in order to achieve the desired learning outcomes from the students.

Education in institutions of higher learning today goes beyond the traditional classroom physical constraint, where lectures, tutorials, practicals, tests and various

forms of assessments of students' academic performance can be conducted via technology-supported platforms. As a result, teaching and learning of students on the contents of the subject can also be conducted online. In this regards, although emerging educational technology usage in institutions of higher learning has increased recently, technology acceptance and usage continue to remain an area of further research (Gong et al. 2004; Saunders and Klemming 2003). With the current development and innovation in educational technology, there are great opportunities for educators to design blended learning environments that are highly effective, realistic and of good quality.

3 Research Framework

In this study, the research framework of blended learning model comprises of four primary blended learning components: classroom, lecturer, technology and student (as shown in Fig. 1). From the technology component, the implementation of this blended learning model involves the use of Taylor's Integrated Moodle e-Learning System (TIMeS) as the learning management system, Facebook as the social learning platform and video as teaching and learning element. The classroom component comprises of lecture, tutorial and practical. The lecturer component comprises of continuous assessment, continuous feedback and final grading. The student component comprises of peer response, self-reflection and Course Experience Survey (CES).

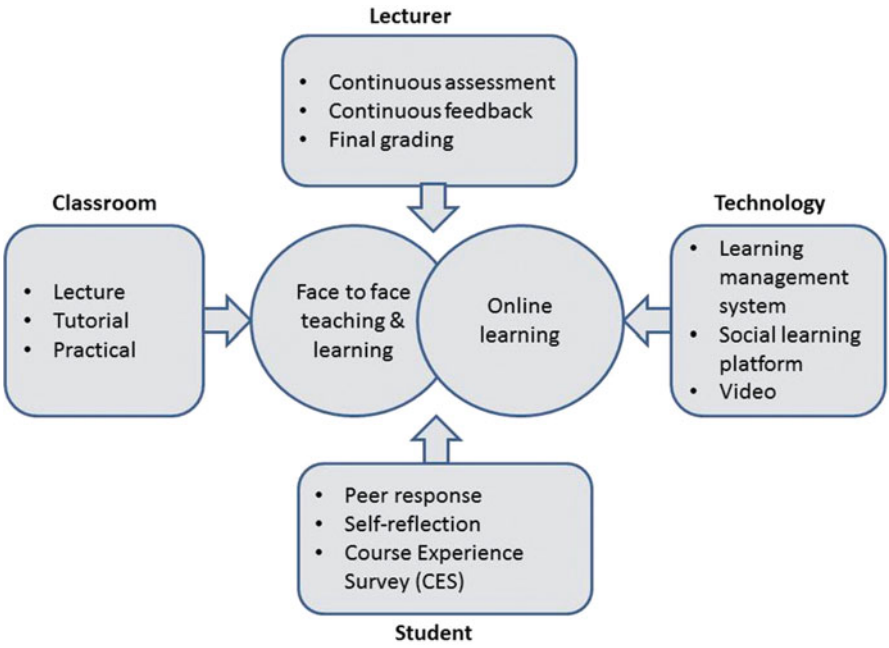

Fig. 1 A blended learning model

In higher educational institutions, the use of learning management systems (LMS) as the platform of teaching and learning has become almost mandatory. LMS provides effective blended learning environments built on social constructivist theories. At Taylor's University, the official LMS that we are using is named Taylor's Integrated Moodle e-Learning System (TIMeS), which is customised from Moodle. Moodle is an open-source community-based e-learning software tools for learning. TIMeS provides various features in enhancing learning experiences for our students, ranging from various online resources, online assessment to online forum. TIMeS also integrates REWIND, which is video capture of live lecture sessions. REWIND provides recorded lectures, which are very useful for revision purpose.

Social learning platform also plays an important role in encouraging self-learning and lifelong learning of students. Facebook is widely considered as the popular platform for online social networking among university students. In this course, we use closed group in Facebook to facilitate communication between students and lecturers to engage in academic business. Using Facebook group, students and lecturers can communicate and collaborate more effectively and efficiently by sharing ideas, problems and solutions for educational purposes. With Facebook group and messenger, lecturers can share contents in real time and deliver it in a personalised way to their students. Facebook group also contributes to student-centred learning, as it allows effective peer-to-peer communications, and sharing of resources, which encourage students to take a more proactive role in their learning. A blended learning model is a promising approach for integrating formal and informal learning using Facebook and supporting student self-learning in higher education contexts.

In higher education, lecturers are major users of and believers in social media. Many lecturers are using social media in courses they are teaching. As such, we also believe that social media offers value in teaching. Video, podcast and wiki are valuable tools for teaching, and social media sites can also be valuable tools for collaborative learning. In this module, we have chosen video as a rich medium in order to effectively deliver complex knowledge to students. There are various methods to utilise video in order to create motivating and immersive learning experiences. Indeed, a picture shows a thousand words, and a video shows a million words. At Taylor's University, our supporting department, e-Learning Academy also provides REWIND-on-the-go service, where lecturers can design, create and prerecord video lectures before the class at their own time and place and then upload to TIMeS for students to view as a flipped classroom methodology.

4 Research Methodology

The research method proposed here was quantitative approach. Data was collected from Course Experience Survey (CES) and academic results. For academic results, we included and compared the results for students pursuing RMIT Degree Programs, i.e. Bachelor of Computer Science and Bachelor of Information Technology. In this study, we implemented this blended learning model in two semesters, i.e. semester 1, year 2013, and semester 1, year 2014. For semester 1, 2013, which was from

February 2013 to June 2013, there were a total of 71 students enrolled in the course User Interface Programming for RMIT Degree Programs at School of Computing and IT (SoCIT), Taylor's University. And for semester 1, 2014, which was from February 2014 to June 2014, there were a total of 44 students enrolled in the course User Interface Programming for RMIT Degree Programs at SoCIT, Taylor's University. This course had three components, i.e. lecture, tutorial and practical. TIMeS as the learning management system was used during lecture session for managing lecture slides, tutorial questions, practical exercises and submission of assignments. Facebook group as social learning platform was used during practical session for collaborative learning, online discussion and sharing of learning resources among students and lecturer. Video as teaching and learning element was used during tutorial session to showcase the related course contents in a multimedia context to enhance understanding of students towards the knowledge of this course.

5 Results and Discussion

The results of this study showed that this blended learning model contributed to student satisfaction and improved the academic results of the students. The results were extracted from Course Experience Survey (CES) done by the students enrolled in course User Interface Programming for RMIT Degree Programs at SoCIT, Taylor's University, for semester 1, 2013. There were 35 responses for CES, and as such, the data presented in CES were considered to be sufficient for use, including for academic expectations. From the CES, the score of Good Teaching Scale (GTS) was 83.30 % and Overall Satisfaction (OSI) was 97.10 %. In more details, the CES results also showed that 97.00 % agreed that the learning objectives in this course were clear, and as an overall, students were satisfied with the quality of this course. 91.00 % agreed that the lecturer in this course motivated students to do their best work, and 88.00 % agreed that the lecturer was extremely good at explaining things.

We also extracted the results from CES done by the students enrolled in course User Interface Programming for RMIT Degree Programs at SoCIT, Taylor's University, for semester 1, 2014. The total enrolled student number is 44 students. There were 30 responses for CES, and as such, the data presented in CES was considered to be sufficient for use, including for academic expectations. The CES results also showed that 98.00 % agreed that the learning objectives in this course were clear, and as an overall, students were satisfied with the quality of this course. 93.00 % agreed that the lecturer in this course motivated students to do their best work, and 91.00 % agreed that the lecturer was extremely good at explaining things.

In comparison with the previous semester in 2012 where we had not implemented this blended learning model, overall academic results in year 2013 for the course User Interface Programming showed better performance with zero failure. Total number of students was 71. As comparison, the average results for students pursuing Bachelor of Computer Science had increased from 73.00 marks to 81.62 marks, and the average results for students pursuing Bachelor of Information Technology had increased from 57.63 marks to 79.09 marks.

Table 1 Summary of academic results

Criterions	Semester 1, 2012[a]	Semester 1, 2013	Semester 1, 2014
Passing rate	86.20 %	100.00 %	95.46 %
Average results for students pursuing Bachelor of Computer Science	73.00 marks	81.62 marks	84.89 marks
Average results for students pursuing Bachelor of Information Technology	57.63 marks	79.09 marks	77.42 marks

[a]Before blended learning environment is implemented

Table 2 Feedbacks from CES on blended learning environment

No.	Feedbacks from students in the class	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
1.	Blended learning help them to improve their learning experience compared with traditional face-to-face learning	80.00	10.00	10.00	0.00	0.00
2.	Learning management system is an effective and efficient tool to improve their studies	73.33	20.00	6.67	0.00	0.00
3.	Facebook group as the social learning platform helps to improve communication and sharing of knowledge between students and lecturers	90.00	6.67	3.33	0.00	0.00
4.	The use of videos in the class stimulates their interest in this subject	80.00	13.33	6.67	0.00	0.00
5.	The use of blended learning environment via learning management system, social learning platform and video improves their results	83.33	13.33	3.33	0.00	0.00

As in year 2014, overall academic results for the course User Interface Programming had a 95.46 % passing rate with 4.54 % failure rate. Total number of student was 44. The 4.54 % failure rate was due to the fact that two students had later decided to transfer to another programme and did not show up for final exam. In comparison with the previous semester in 2012, the average results for students pursuing Bachelor of Computer Science had increased from 73.00 marks to 84.89 marks, and the average results for students pursuing Bachelor of Information Technology had increased from 57.63 marks to 77.42 marks. A summary of the academic results is shown in Table 1.

In semester 1 2014, we conducted additional survey questions in CES. The CES results showed encouraging feedbacks from students regarding the use of blended learning environment via learning management system, social learning platform and video in order to enhance their learning experience. The feedbacks are shown in Table 2.

6 Conclusion and Future Study

For this study, an effective blended learning environment has been established, which integrates the use of learning management system, social learning platform and video. The findings indicate that students' interest to learn has increased from this blended learning model, which in turn can enable them to achieve better learning outcomes. As a conclusion, this blended learning model can be a valuable strategy to facilitate both lecturers and students to obtain better educational outcomes. As the technology advances exponentially, challenges remain in higher education to integrate the emerging technology into the area of learning and teaching.

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The Perceptions of MOOC Among Learners Based on Activity Theory

Wei Wei Goh, Sukhminder Kaur, and Zheng Hao Addy Chion

Abstract Since Massive Online Open Courses (MOOCs) have started to bloom in education industry, there are many discussions about their design, structure, effectiveness and openness to the community. It is undeniable that MOOCs have changed the teaching and learning style of students and lecturers. The purpose of this study is to explore the perception of learners towards the usage of MOOCs based on Activity Theory. Besides that, this study also investigates the current issues faced by learners in using MOOCs and suggests ways of improvement. Questionnaires were distributed to 160 learners to fill in. Results indicated that most of the learners agree that MOOCs are useful in their learning and they claim that it has improved their learning. They are satisfied with MOOCs and will recommend MOOCs to their peers. In overall, the availability of MOOCs to the world and the free accessibility has become the reason why it is popular among learners. They believe that soon MOOCs will be able to complement the traditional teaching method in order to make the learning process more effective. Due to time constraints, the information obtained was from a small part of the community in the country and hard for generalization. In the future, research can be expanded to focus on the different parts of the country and various disciplines such as business and engineering. Lastly, with the result obtained in this research, it will be able to contribute to universities and institutions that plan to introduce and implement MOOCs as a guide for them as design and implementation.

Keywords MOOCs • Activity Theory

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1 Introduction

Massive Open Online Courses (MOOCs) is a free Web-based distance learning program that is designed for the participation of large numbers of geographically dispersed students (Barnes 2013). George Siemens and Stephen Downes are acknowledged as one of the MOOC pioneers in its current form in the year 2012 that brought in considerable recognition for MOOC and huge media attention throughout the world. Apart from that, *The New York Times* even classified the year of 2012 as the 'Year of the MOOC' and describes MOOC as free, credit less and massive online course (Baggaley 2013). Since then, it has become the hot topic of discussion among educators, researchers and institutions. Although MOOC does not always offer academic credits, they provide education that may enable certification, employment or further studies (Ghosh 2014).

1.1 Background

Since Massive Online Open Courses (MOOCs) have started to multiply on the Web, many discussions about their structure, effectiveness and openness have been appearing. MOOCs are proven to be beneficial due to its massiveness, openness and high accessibility and provide completely free education knowledge. However, there are researchers who criticize MOOCs for being able to destroy the traditional education and brought out a lot of issues (Vardi 2012). This is the opinion of those who do not experience MOOCs before or have very little experience with MOOCs. Hence, what are the real perceptions of the users of MOOCs who are mostly university learners and academic lecturers? Therefore, the authors have the intention to study the perceptions of MOOCs among university learners based on Activity Theory and the issues faced by them when using MOOCs.

1.2 Objective

The main objective of this study is to explore the perception of learners towards the usage of MOOCs based on Activity Theory. The research questions are guided by the Activity Theory which is also used as the research instrument. Components in Activity Theory such as artefacts, subject, community, rules, division of effort and outcomes are used to investigate the perceptions of learners in using MOOCs. This study also explores issues faced by the learners when using MOOCs and thus proposes recommendation and solution which will be greatly beneficial to the community of MOOCs and improve the quality of MOOCs in education.

The next section reviews literature on the background of MOOCs and its usage. Activity Theory is explained and justified based on previous studies. This is followed

by the explanation of data collection and data analysis in this study. The preliminary findings of this research are presented followed by discussion and recommendation.

2 Literature Review

2.1 MOOC

Massive Open Online Courses (MOOCs) are defined as a learning model that has no limit to the number of students or learners who can enrol in an online course anytime and anywhere around the globe (Peterson 2014). Furthermore, it is an open registration online course with a publicly shared curriculum. MOOC integrates social networking and accessible online resources and is facilitated by leading practitioners in the field of study. Most significantly, the fundamental role of MOOC is the engagement of learners who self-organize their participation according to learning goals, existing knowledge, skills and common interest. In a simple way, MOOC is an online course which consists of recorded online video lectures on any given topic by one or more university professors and educators that is then easily accessed online by anyone around the world. Learning materials are host in a cloud and delivered online so that it can be accessible from anywhere on the Web.

There are a few existing MOOC platforms, including Coursera, Udacity, and EdX, that allow universities to offer and host their MOOCs for global audience. The difference between these three platforms is that Udacity and Coursera are classified as for-profit organization (Dakkak 2013). On the other hand, EdX is a nonprofit joint venture between Harvard, MIT and also partners with other universities. EdX even make their source code to be opened to the public so that anyone can build their own platform using its courses (Dakkak 2013).

Developing country like Malaysia also realizes the power of MOOC. The first MOOC in Malaysia is offered by the School of Engineering at Taylor's University on a course named Entrepreneurship. Entrepreneurship is a 14-week course. It is aimed at developing business-related skills to complement the technological knowledge and skills acquired by the engineering students (Al-Atabi 2014).

In conclusion, MOOCs have attracted a diverse group of learners from all age groups and over a hundred countries around the world and also the public, researchers and educators, due to the different learning experience in MOOCs as compared to traditional courses.

2.2 Activity Theory and Previous Studies

Activity Theory is a conceptual framework originating from the sociocultural tradition in Russian psychology developed by Aleksei Leontiev who is a Russian psychologist (Kaptelinin 2013). In 1987, Engestrom proposed another version of

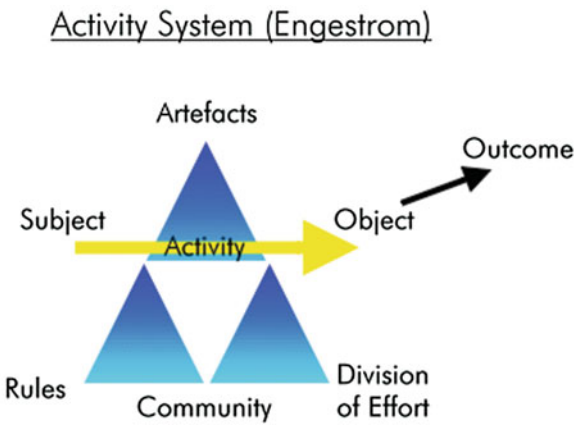

Fig. 1 Activity theory model

Activity Theory based on Leontiev's framework, the Engestrom's model which is widely being used not only in psychology but also in a range of other fields, including education, organizational learning and cultural studies (Kaptelinin 2013).

Engestrom's model as shown in Fig. 1 is useful for understanding how components work together to bring impact on an activity, and in order to reach an outcome, it is necessary to produce certain objects in which human activity is mediated by artefacts, an organization and community, whereby the community may impose rules that impact on the activity. The subject may also works as part of the community to achieve the object (Learning Theories and Models Summaries 2014).

According to Nardi (1996), Activity Theory is a powerful tool with a set of theoretical concepts to help understand the relationship between the human mind and the activity, from which various methods and approaches for analysing human activity can be developed. Everything is clearly defined, such as the role of the teacher in the division of labour within the system, institution as the community that is heavily prescriptive regarding tools and objects with outcomes frequently being seen as formal acquisition of qualifications, students or learners as the subject and the selection of the tools which is used to mediate the learning.

Many previous studies have used Activity Theory to explore learners' experiences when introduced with new technologies. Hardman (2005) uses Activity Theory to understand how teachers use computers to mediate mathematics teaching and learning at a primary level and whether the novel technology will force shifts in pedagogical practices. Issroff and Scanlon use the Activity Theory to understand the learners' experience in ICTs within higher education that focuses more on learning outcome (Coverdale 2009). Blin uses Activity Theory to identify challenges faced in online educational environments and whether new tools facilitate or impede with learning processes by studying the design and implementation of the new learning-supported technology (Murphy and Rodriguez-Manzanares 2008).

A research was conducted by Mandy Asghar from the UK that uses Activity Theory to explore the formative assessment on how it can be used to effectively

deliver and enhance student learning in the higher education setting (Asghar 2013). This research was conducted on how cultural historical Activity Theory can be used as a qualitative analysis framework to explore the complexities of formative assessment as it is used in higher education and provide an insight into the complexity of such experiences, such as about what teachers should do and why and the influence of the community in which they are situated (Asghar 2013).

Activity Theory has proven to be able to provide insights on the changes in teacher's practices on how their teaching is "restructured" when a new technological tool is introduced. Therefore, Activity Theory is chosen in this research to investigate the perception of learners in using MOOCs for learning.

3 Research Methodology

3.1 Data Collection and Data Analysis

Quantitative approach is used in this study to explore the perceptions of learners in using MOOCs. Questionnaire was designed based on Activity Theory to collect data about their previous experiences and opinions in using MOOCs. These questionnaires were then distributed to the respondents through Google technology called the Google Form in Google Docs Online.

In this research, online questionnaire was administered to 160 learners from various MOOC platforms. The online questionnaire comprised of five sections and over 20 questions. The first section revolves around the respondents' demographic information such as how long has the respondent used MOOCs, how old is the respondent, etc. Respondents were asked about their usage in MOOC and how they feel about the tools. Furthermore, the respondents were asked regarding the problem faced when using MOOCs.

As for data analysis, Google Forms technology allows the creator to convert all the result of the questionnaire into numerous graphs. With this graph generated, results of the questionnaire can be seen clearly and will be elaborated in the next section.

3.2 Results

There are a total of 160 learners participated in this study from various MOOC platforms. The respondents have experiences in using MOOCs in their respective MOOC platform. A total of 95 males and 65 females participated in the study. One hundred and one learners fall under the age category of 24 and above.

Figure 2 shows each component of MOOC based on Activity Theory. The preliminary results are elaborated based on components in Activity Theory.

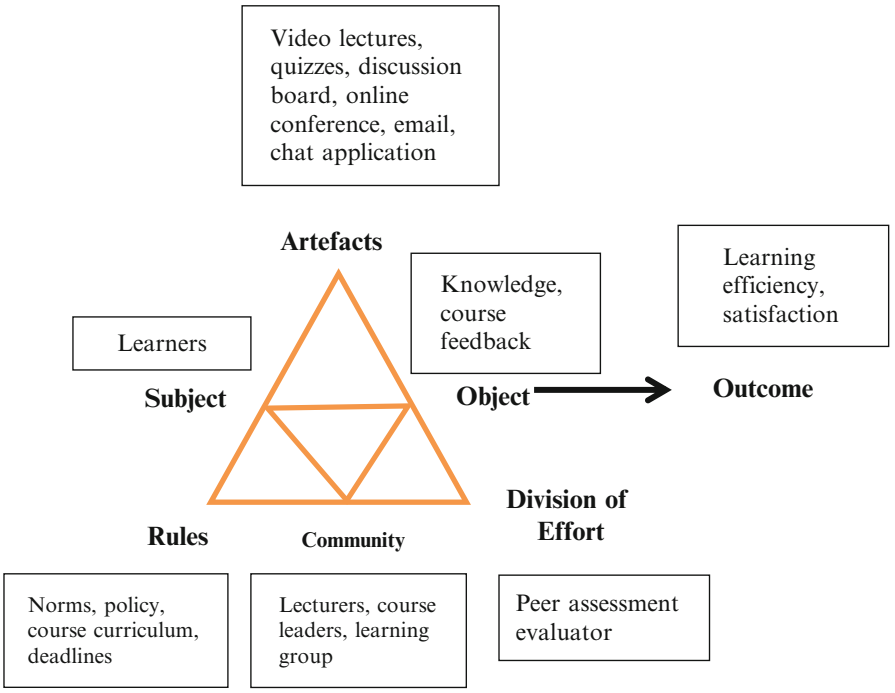

Fig. 2 Components in MOOC based on activity theory

1. *Experience in using MOOC for learners (Subjects):*
   The results show that almost half of the total number of learners which is 75 of them has used MOOC for more than half a year. Forty out of 160 learners have used MOOC for the duration of 1–3 weeks. The result shows that MOOC is able to attract learners to use it for more than half a year.
2. *Video lectures/quizzes (Artefacts):*
   One hundred and fifty out of 160 learners agree that by using video lectures and quizzes in MOOC, the efficiency of learning increases. They believe that quizzes are an effective way to evaluate the progress and understanding level. They feel more committed to the course. Besides that, they also expressed that quizzes give feedback and verify whether they are learning the correct knowledge from the course. Moreover, learners also expressed that video lectures are able to enhance their memory where they can replay the video/audio that they have missed and thus help them to recall the important information. Besides enhancing their memory, the learners also stated that video lectures also help to improve learning experience by stimulating real environment of learning and also helps the "Kinesthetic" people to have a feel of the actual process. Audiovisual content is one of the best ways to receive and process learning materials because it engages two of our senses, providing an entertaining video with richer content and engaging with the learners. Other than that, the learners also believed that

video lectures and quizzes in MOOC provide flexibility and convenience where learners can be flexible in arranging their time to learn at their own pace.

On the contrary, there are those who do not agree that video lectures are effective as some of the lecturers post a long video lecture without giving sufficient time for the learners to learn. When the video is long, this may discourage learners to pay attention and they tend to give up easily.

3. *Discussion boards and online conferences (Artefacts):*

   One hundred and seventeen learners think that online interactive activities in MOOC like discussion boards and online conferences can be an alternative to face-to-face classes. Majority of learners agree that group discussion in MOOC facilitates the collaboration of learners and lecturers which increases the motivations among the former. Learners receive useful insights through group discussion. Feedbacks help them to broaden their thinking. Apart from that, feedbacks also encourage them to see what they need to improve and focus on. According to the learners, group discussion gives them an opportunity to clear their doubts, expand their vision and make them reflect on their thoughts. As for some introvert learners, they feel more comfortable in typing their comment online in the discussion comment box as they do not feel afraid or shy; this also enables them to express themselves with all kinds of enlightening comments. However, some learners expressed that the questions they have posted in the discussion group do not get immediate response; therefore, engagement becomes less and people will eventually give up.

4. *Who introduce MOOC to the learners (Community):*

   Eighty learners know about MOOC through the Internet and Web search. Besides Internet search, the learners also stated that they found courses offered in MOOC through social networks such as communities group in Facebook, news item on television, news article in newspaper, blogs and online advert. This shows that people usually explore MOOC themselves through the Internet and other physical sources. The remaining learners were introduced to MOOC by their family, lecturers and friends.

5. *Role as a peer assessment evaluator in MOOC (Division of Effort):*

   One hundred and forty-seven learners agree that the role of a peer assessment evaluator in MOOC is important. The role of peer assessment evaluator encourages learners to validate and review their information. Besides that, peer assessment evaluator also helps the learners to see many different opinions about their work and improve it when the peer evaluates their assignments. This facilitates group-based learning where other peer spots errors and mistakes which can help them to see things in a different way and enable them to take a deeper understanding of the course material.

   For those learners who do not agree, it is because they think that they still need professional guidance and the answer provided by peer is not always correct and learners only give assessment based on what they think it is right. Thus, lecturers should enlighten the learners by giving some tips about assessing constructively, and then the lecturers could let the learners evaluate each other by giving them some time to understand how to properly and fairly grade assignments.

6. *Satisfaction with MOOC (Outcome):*

   The result shows that 120 learners are satisfied with MOOC. One hundred and fifty-seven learners will recommend MOOC to other people. This proves that the outcome of the MOOC is very successful as most of them will recommend MOOC to other people which make MOOC to be able to spread to more people. Majority of learners find that MOOC has contributed to their educational experience or their continuous professional development after they have completed their MOOC course.

4 Discussions and Recommendations

The problem faced by the learners is the difficulty in navigating the platform which has caused them to lose their interest in using MOOC as this is considered wasting their time to obtain what they want. There were also technical issues faced by the learners such as video lectures which do not play smoothly, glitch of faulty quiz selection, errors in the online platform, interface issue, unreliable Internet connection and the learners' always encounter with lag as though the platform does not have enough servers to keep the system running smoothly. If the learners keep facing these technical problems, they will not be able to complete all the activities in the course which means they will just leave the course.

Another problem is that some of the video lectures in MOOC are too long, and the learners would like the lecture to be short and precise. Short and precise video lectures catch more attention. The learners can save a lot of time and gain knowledge at the same time. When the video is too long, learners will lose their interest, and they tend to move to other topics which are shorter.

Various suggestions and recommendations have been proposed on how to improve MOOC. It is suggested that designers need to develop a better interface for MOOC to ensure good and user-friendly navigation. Interesting quizzes and interactive videos in MOOC are important to maintain learners' attention and let them have more choices. Next suggestion is to maintain the server stability and performance to ensure a stable performance of the platform. On the other hand, games and animated lectures can be added in order to make the video lectures more interesting. Chat box interface can be enhanced so that the learners are able to communicate with each other more effectively.

Next, MOOC catalogue can be prepared for every course so that learners know the background and preview of the course before they enrol. On the other hand, it is recommended that MOOC should provide an online downloadable syllabus, a shorter version of lecture notes printable in various formats to keep the interest of learners.

5 Conclusion

This research provides insights on the perception of learners in using MOOC. The contribution of this research can help those universities or institutions who plan to implement MOOCs and introduce MOOCs to their students. Besides that, the result obtained in this research gives them a thought of the problems faced and recommendation which can be used as a guide to design their MOOCs and to improve their MOOC courses in the university. Furthermore, this research also contributes to the MOOC community in terms of whether learners are satisfied with the current MOOCs and what changes and adjustments are needed on MOOCs in order to ensure that the learners get what they want when they enrol. The limitation of this research is that the information obtained was mainly from a small part of the community where there are only 160 respondents. For further study, research can be continued by expanding this research to different parts of countries and different MOOC platforms. The researcher can also study on the usage of MOOCs in other industries like business, engineering and so on.

In conclusion, the preliminary results of this study validate that MOOCs are useful in learning and have enhanced the learners' knowledge.

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What Have Students Gained from College Experience?

Kok Choy Cheong and Bessie Ong

Abstract Student engagement in cognitive and noncognitive activities in college can directly influence the quality of students' learning and enrich their overall college experience. In recent years various efforts have been made by several Malaysian higher learning institutions to create educational settings in the campus to support student learning and personal development. The actual participation in these college activities is however multidimensional; thus it is important for an institution to be informed about the ways that their policies had impacted students. This study reports on our survey to identify students' self-estimation of gains in a 2-year credit transfer program at a private Malaysian university where several policies have been introduced to engage students in a holistic education. A convenient sample was obtained comprising students who are in the program for at least four semesters as they have a longer association with the program and would be able to report a more meaningful experience. Students reported gains in communication skills, interpersonal relationships, appreciation of diversity, and a better understanding of themselves. Furthermore, they are highly satisfied with this program as reflected by a high rating on their willingness to return to this program if they were to start again.

Keywords Student engagement • College experience • Student outcomes

1 Introduction

An enriching college experience encompasses activities that are associated with learning as well as other noncognitive but educationally purposeful activities. Involvement in such activities, also known as student engagement (Kuh 2001), is positively related to learning outcomes, personal development, satisfaction, and retention (Pascarella 2001; Astin 1999; Tinto 1993; Kuh et al. 2008; Carini et al. 2006). Information about student engagement in programs and activities that are

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provided by institutions in North America is widely obtained annually through the National Survey of Student Experience (NSSE). The results provide an estimate of how undergraduates spend their time and what they have gained from attending college. Such information is valuable for the institutions to know about the effectiveness of their policies, programs, cocurricular activities, and other support services in encouraging student participation (Kuh 2001).

In recent years Malaysian higher education institutions have grown and evolved to the extent that education is now considered as a service industry which has to meet the expectations and needs of their customers, the students. To gain a competitive edge, many higher education institutions in Malaysia seek to redefine and articulate their purpose that is now focused on transformative educational experiences for their students. Our institution, in particular, has made campus-wide changes in course curricula to embed generic skills so that our students are better prepared to function in a dynamic and global working environment upon graduation. Additionally various systems and policies are put in place to support student learning.

The American Degree Transfer Program (hereafter known as ADP) is one of the many programs conducted at this institution. The ADP which follows a liberal arts curriculum has always emphasize an interactive approach that get students to be become involved in and out of the classroom. Although course instructors have often obtained feedback through reflective journals and otherwise about specific capabilities achieved in their courses and projects, there is little information on the program-wide gains derived from student participation. Hence we decided to survey students to determine the dimensions in which students are engaged, their relationships with others, and the attributes that are important to satisfaction with ADP. This paper reports on only one of the dimensions, that is, Estimation of Gains, with the aim to address three research questions:

1. What are the types and levels of gains achieved?
2. How do students perceive the systems and relationships with others at ADP?
3. What attributes determine students' willingness to return to ADP?

2 Literature Review

The conceptual framework of student engagement is described by Astin's theory of student involvement which is based on the input-environment-outcome (I-E-O) model (Astin 1984, 1999). This theory explains involvement as the quantity and quality of efforts that a student devotes to academic and social activities on campus. Hence, an involved student will spend time on activities associated with learning, be present on campus, participate in cocurricular and extracurricular activities, and interact frequently with their peers and faculty. Astin relates the extent of students' involvement to three elements. The student's demographics and previous experience are the "inputs" that he/she brings upon entry. Opportunities, i.e., the "environment", for engagement in and out of the classroom are created by the institution. Then the impact of these experiences will result in changes or "outcomes." Whatever

the precollege characteristics of an individual, the experiences incurred in a learning institution of his/her choice are apt to reinforce and extend those characteristics.

Astin's theory has guided the assessment of the extent of engagement and impact of college experiences in many North American universities from data collected by the National Survey of Student Experience (NSSE). Pascarella and Terenzini's (2005) review of more than 2,600 empirical studies on the impact of college showed students have gained competency in subject-specific matter and general cognitive and intellectual skills; improved self-concept, attitudes, and values; attained maturity in their interpersonal relationships; and developed more tolerant views on diversity during their college years.

Astin further explained that student involvement is the key to student retention in college – students who are involved persist in college and students who are not often leave college. Nontraditional students who commute daily to class are found to be less involved in activities outside the classroom compared to those who live on campus and also more likely to drop out (Jacoby 2000; Pascarella and Terenzini 2005). The concept of involvement and retention is much aligned with Vincent Tinto's (1993, 1999) theory of academic and social integration. Tinto believes that institutional efforts to create educational settings in the campus environment for students' engagement will support student learning and personal development. Positive college experiences will raise self-confidence and develop a sense of commitment and identity with the institution which in turn increase the likelihood of retention. Other studies show that students who are active in cocurricular activity particularly student organizations, leadership roles, and campus residence halls also have better grades (Astin 1999; Carini et al. 2006; Kuh et al. 2008; Pascarella 2001; Tinto 1993).

3 Method

3.1 Participants

The pool of participants consisted of 168 full-time students ($n = 168$) between the ages of 18 and 21, who are enrolled in a 2-year credit transfer ADP program at a private university in Malaysia for at least four semesters. This sample represents almost 50 % of the student population who had been in ADP for at least four semesters. These are chosen as they have been in the program long enough to be able to provide a more accurate feedback on their college experience. The sample consists of nearly equal proportions of male and female.

3.2 Data Collection

We used the National Survey Student Experience (NSSE, Indiana University) questionnaire as the dimensions in this survey are relevant to the objectives of the various policies in this program. The dimension that is the focus of this study is the

"Estimation of Gains" which has 25 questions. Each question is scored on a 5-point Likert scale (1=none, 2=very little, 3=some, 4=quite a bit, and 5=very much). A separate section, "personal opinion" inquired about students' relationships with peers, faculty, and administrative staffs, respectively, is also scored on a 5-point Likert scale (1=uninvolved/alienation and 5=friendly/supportive). We added two questions under "personal opinion." The first question aims to seek perceptions on how much students like the institution (1=strongly dislike to 5=very enthusiastic) and the second on whether they would choose to return to the same institution if they were to start again (1=I would switch to another program in Taylor's to 5=Yes, I would definitely return). We changed the word institution to ADP in our survey. A convenient sample was obtained over several days with the help of four student volunteers.

3.3 Data Analysis

An exploratory factor analysis (EFA) was used for data reduction to handle all the dimensions in the NSSE, including the 25 variables in Estimation of Gains. Principal component factors were extracted by the Varimax rotation method and Kaiser normalization with 25 iterations. An eigenvalue of 1.0 was used as the cutoff and only items with loading of 0.5 or higher were retained as a factor. Reliability of the samples was analyzed by Cronbach alpha, of which a value of at least 0.7 is acceptable for exploratory research (Hair et al. 2006). Mean Likert scores were calculated for all items in the personal opinion section of the questionnaire. To answer the third question, that is, what attributes determine students' willingness to return to ADP, Pearson correlation analysis was done between "willingness to return" with each variable in "Estimation of Gains" and other variables in "personal opinion."

4 Results

EFA retained only 7 of the 25 variables in the estimation of gains factor and was able to provide an internal reliability analysis alpha scale of 0.85 (Table 1). These variables relate to generic skills such as ability to make a verbal presentation, ability to work with and relate to diverse people in a team, becoming aware of cultural differences and philosophies, ability to use integrated computer technologies, and a better understanding of self. All these variables were rated by students to be above average (mean values >2.50, Table 2). The three highest ratings were recorded for intrapersonal understanding (mean = 4.04), interpersonal relationships (mean = 4.13), and team skill (mean = 4.02).

When students were asked about their relationships with faculty, peers, and administrative staff in ADP, their responses were very favorable with a mean score greater than mean value of 2.5 (Table 3). Students in general like the program with

Table 1 Key variables in estimation of gains factor

Item	Factor loading
Presenting ideas and information effectively when speaking to others	0.550
Using computers and other information technologies	0.642
Becoming aware of different philosophies, cultures, and ways of life	0.566
Developing my own values and ethical standards	0.616
Understanding myself and my abilities, interests, and personality	0.610
Developing the ability to get along with different kinds of people	0.658
Developing the ability to function as a member of a team	0.883
Cronbach alpha	0.853

Table 2 Mean score of key variables in estimation of gains

Variables	Mean	Standard deviation
Presenting ideas and information effectively when speaking to others	3.80	0.91
Using computers and other information technologies	3.85	1.04
Becoming aware of different philosophies, cultures, and ways of life	3.61	1.07
Developing my own values and ethical standards	3.83	0.98
Understanding myself and my abilities, interests, and personality	4.04	0.89
Developing the ability to get along with different kinds of people	4.13	0.92
Developing the ability to function as a member of a team	4.02	0.93

Table 3 Mean score of personal opinions in the Taylor's American Degree Transfer Program

Items	Mean	Standard deviation
How do you like Taylor's ADP	3.82	0.97
If you were to start over again, would you still choose Taylor's ADP	4.08	0.97
How was the academic support system	3.60	0.77
How was the administrative-student support system	3.52	0.80
How was the university placement support system	3.18	0.87
How was your relationship with faculty members	3.51	0.83
How was your relationship with the administrative/office staff	3.23	0.87
How was your relationship with other students in ADP	4.05	0.90

a resounding mean score of about 82 % (4.08/5.00) when asked if they would still choose Taylor's ADP again. Students' ability to foster and establish good relationship between their peers while in the program had a mean score of 4.05/5.00. In the search for attributes that led to students' willingness to return to the program, the Pearson correlation test showed a significant correlation ($p<0.01$) of willingness to return to two variables – the liking of ADP (correlation strength: 48.5 %) and the compassionate academic support system in ADP (correlation strength: 27.9 %). A slightly lower correlation strength of 15.7 % but significant correlation ($p<0.05$) was related to students' interpersonal relationship with various other people in the program (Table 4).

Table 4 Pearson's correlation test of students' willingness to return to the program against each variable in estimation of gains and personal opinion

Variables	P-value
Gaining a broad general education about different fields of knowledge	0.052
Presenting ideas and information effectively when speaking to others	0.083
Using computers and other information technologies	0.990
Becoming aware of different philosophies, cultures, and ways of life	0.354
Developing my own values and ethical standards	0.647
Understanding myself and my abilities, interests, and personality	0.632
Developing the ability to get along with different kinds of people	0.043*
Developing the ability to function as a member of a team	0.152
I like Taylor's ADP	0.000**
How was the academic support system	0.000**
How was the administrative-student support system	0.500
How was the university placement support system at ADP	0.294
How was your relationship with faculty members	0.446
How was your relationship with the administrative staff	0.536
How was your relationship with other students in ADP	0.953

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2 tailed)

5 Discussion

After four or more semesters at ADP, students reported they are able to communicate effectively, work well in teams, and are more tolerant of diversity. These are the payoffs from the broad-based liberal arts curriculum. Through exposure to a variety of academic disciplines – the humanities and fine arts, the social sciences and history, the business management, the natural sciences, and mathematics – our students learn the methods and perspectives of many ways of knowing the world. This makes them versatile in thought and gain the self-confidence necessary to build a sense of community, as well as to bridge differences among classmates. Courses in this program embed multiple opportunities for students to practice skills in the use of language for effective communication. Effective communication in turn builds rapport with others. It also allows the handling of difficult issues, disagreements, tensions, and conflicts. The enduring relevance of this ability to communicate and to work with diverse people is that such skills are powerful assets for our students' future success in a globalized working environment.

Overall students had liked ADP a lot and are willing to return to the same program again if given a choice. This seemed to indirectly suggest that our students must have been highly satisfied with the program. Satisfaction is considered as a subjective view which is based on personal experiences, individual beliefs, and relationships. A satisfied student is deemed as a happy and motivated student with a positive learning attitude (Tough 1982). Oliva et al. (1992) suggest that the critical point of satisfaction is related to a customer's willingness to make repeat purchases

which can be regarded as an expression of brand loyalty (Chaudhuri and Holbrook 2001). Hence, there is a positive correlation between satisfaction and customer loyalty. In the context of this study, we would like to extend the same analogy that willingness to return to ADP can be perceived as students' loyalty and thereof satisfaction with the program. Two other significant factors that were found to contribute to this satisfaction are the interpersonal relationships they experience in this program and especially the academic support here.

Although the scope of this study did not investigate the types of academic support, we strongly believe the core of the academic support that students associate with their loyalty to ADP lies in the numerous opportunities for face-face dialogue between students and instructors in the pursuit of learning in and out of the class. Because the classes in this program are small ($\leq$30 students per class), it is impossible for anyone to remain anonymous, making it possible for close monitoring of students' academic progress. Instructors are always aware of tardiness, absenteeism, and those who are facing academic difficulties. More importantly students at ADP are encouraged to actively participate in class discussions and to seek the instructor's help after classes to address specific topics that are still unclear. We view this condition as indispensable for effective learning. Lecturers in charge of clubs and societies are available for regular consultation for projects and cocurricular activities. Additionally instructors also function as advisers for course selection and registration, besides giving assistance with exploring majors and career options. All lecturers at ADP are therefore dedicated to helping students realize their fullest intellectual and personal potential.

Students' favorable evaluation of their experience at ADP might have other implications. Service satisfaction has been reported to exhibit secondary behaviors, such as referral inclination or willingness to recommend the product to another (Parasuraman et al. 1994), as well as whether customers will remain or defect from the company (Zethaml et al. 1996). Thus satisfaction with the service at ADP could mean that the program's word-of-mouth recommendation remains strong and can contribute to future success in recruiting and retaining students. Although retention is a complex phenomenon, one of the promising ways to reduce the institution's dropout rate is to focus more on students' satisfaction. Schreiner (2009) illustrated that there is indeed a direct association between student satisfaction and retention.

Our current findings add to our previous work (Cheong and Ong 2014) by suggesting that the high retention rates among the dominant student subcultures (the undecided and uncommitted) at ADP could also be attributed to their satisfactory experiences. We conclude that this satisfaction is most likely the outcome from the typical instructional/learning environment at ADP where students are given opportunities to discover themselves and their talents and to contribute toward the vitality of the campus community.

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2D Side-Scrolling Game: Applying Motivation and Digital Game-Based Learning (DGBL) in English Learning

Seng Yue Wong, Wee Jing Tee, and Mohamad Al-Azhar Bin Jasman

Abstract With the popularity of the video game media amongst the young adults, providing a digital game-based learning of the English language could increase the level of knowledge of the English language amongst young adults and university students. Perception of English as a difficult subject to learn, lack of motivation amongst students and inadequate or insufficient exposure to the language are several problems in English learning. It is important to solve this problem because the high proficiency of the English language is very important for knowledge acquisition, especially in the higher education system. The proposed solution is a digital game-based learning (DGBL) classic 2D side-scrolling video game with original artwork and music to ensure originality. This game will feature language teaching of the higher education level of the English language and consists of two types of English module, text and sound. In this paper, we do some literature reviews and present findings from preliminary analysis on English proficiency problem and students' readiness for DGBL. The design and development of the game will be presented with some snapshots of the game prototype. Finally, user acceptance testing for the game prototype will be discussed. All the functional requirements and test cases are tested and fulfil the requirements.

Keywords Digital game-based learning (DGBL) • English learning

1 Introduction

The popularity of computer games is rising dramatically, and it has been used as a learning tool and significantly increases effectiveness of learning. Serious games focus on learning process and try to emulate scenario in professional context in predetermined ways via interactive and immersive graphical environments in

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two-dimensional (2D) or three-dimensional (3D) with sound and animation elements (Carvalho 2012). Digital game-based learning (DGBL) has been widely utilized in various areas such as military, education, marketing and advertising from the Google statistic which showed that game-based learning (GBL) retrieved 162 million hits on a Google search (Mazeyanti et al. 2014). DGBL studies also emphasize on natural learning process that happen within the game. Hence, DGBL has the potential to make learning process to be fun, easy, more interesting and more effective (Papastergiou 2009). GBL is claimed to be an alternative learning and training tool for motivating too.

In higher education sector, we found that students have limited ability to respond appropriately to an academic text (Muhammad 2007) and lack conventions for academic writing in academic discipline (Krishnakumari et al. 2010). Previous research also indicated that students are not prepared for the reading demands that are imposed on them at a university (Nambiar 2007). Due to perception of English language as difficult to learn, lack of motivation amongst students and inadequate exposure to the language, proficiency of English is not as good as it should be (Normazidah et al. 2012).

Therefore, with the popularity of the video game media amongst the young adults, providing a digital game-based learning of the English language could increase the level of knowledge of the English language amongst young adults and university students. It is important to solve this problem because the high proficiency of the English language is very important for knowledge acquisition, especially in the higher education system. The individuals that will benefit from the system proposed would be the young adults and university students that are lacking in English proficiency and also anyone who is lacking proficiency in the English language.

The main focus of this paper is applying motivation and utilizing DGBL in English learning via 2D side-scrolling game. First, we will discuss DGBL in English teaching and learning, preliminary analysis and students' readiness for DGBL. Besides that, we also will show some snapshots for the 2D game. Finally, we will review the evaluation results and its impacts in English teaching and learning.

2 Digital Game-Based Learning (DGBL) in English Language Learning

There is a statement that students learn by doing and learn by playing since ancient times. Students can practise their skills and acquire attitudes when they are playing games. The skills mentioned here are useful for intellectual, social, emotional and motoric development. With the arrival of digital games in this advanced technology decade, digital games provide more opportunities for students to control their own learning process and reinforce their skill mastery and accommodate multiple learning styles and abilities (De Grove et al. 2012). However, there is an argument about

how and why information and communication technology (ICT) is used in the classroom. Then, how is the adoption of digital games in school? How can it be framed in broader context in formal education, such as English language learning? Thus, we had done some literature reviews on this.

In language teaching, games are often used as teaching tool to increase motivation, and authentic communicative practices as a result of games have been conceptualized as an enjoyable factor in language leaning. Students and teacher become more interested in the learning and teaching process with the fun and enjoyable environment created by games. If we view from another aspect, games also have been related to leisure activities since gaming is a key activity in students' off-school practices (Asraf et al. 2014). The interactivity that is provided by the games is the key factor that enables students to learn the language within their communicative activities when they are playing games. Asraf and other researchers (2014) had indicated that online games are proved to be more effective in learning English vocabulary.

Besides that, Chen and Tsai (2010) also proposed an interactive location-based game to facilitate English learning. The game was supported by WLAN positioning techniques. Students log in the proposed system and the system will provide clues that the students must identify after a listening exercise which comprises an English commentary. An interesting study by Pereira (2013) is done on the viability of interactive fiction as a valid and useful tool for language learning. Interactive fiction or IF is a text-based game or popularly known as "text adventures" in which scenarios are presented to students and students have to respond to the game by actually typing in commands to solve the series of logical puzzles within the text-adventure world. IF is essentially a text-accepting and text-generating computer programme that immerses the player in the game world without the representation of graphics or sound. It still provides an engaging experience and is making language learning as a main focus.

There are still some limitations on utilizing DGBL in English language learning, such as network problem. The research that was conducted has revealed that games with more sophistication and enhanced interface resulted to a better literacy outcome (Wan 2013). These findings also suggest that games are significantly proved to lead positive outcome in teaching and learning.

3 Preliminary Analysis

A survey was conducted to gather information on English language learning problems and their readiness for an interactive way in English learning to optimize their learning. The respondents were consisted of students from Taylor's University students and some students from other universities in Malaysia. The questionnaire was conducted entirely online due to the ease of access and efficient collection of survey data and analysis of the survey data. There are thirty-one respondents who completed the online questionnaire survey. According to Sekaran (2000), sample size

between 30 and 500 is suitable for most studies. However, sample size between 10 and 20 is allowed for this kind of study. The questionnaire is consisted of questions related to gaming and questions that will validate the target age group on their awareness of digital game-based learning. There are a total of eight questions in the questionnaire. The teacher experts reviewed all the questionnaire and terms used in the instrument that can help to determine the most relevant issues.

The data analysis from this survey suggests overall that the respondents are active in playing video games. It is also clear that most respondents are not motivated in learning the English language. Lack of motivation in learning the English language can be improved by providing an engaging and interactive way of learning. However, most of the respondents agreed that having a high proficiency in the English language is important. Furthermore, the respondents also agreed that an interactive way of learning is better than the traditional way of learning. The analysis of the data gathered from the questionnaire can justify the need for a digital game-based learning (DGBL) platform such as a video game that directly or indirectly teaches the English language to students of higher education.

4 2D Side-Scrolling Game Design

The game prototype is developed by using the GameSalad Creator for Windows. This game engine lets users create a game based on actors and behaviours. The game engine uses visual editors and behaviour-based logic system. The graphical user interface of the GameSalad Creator allows real-time visualization of the prototype. This greatly increases efficiency and accuracy of the development process. Figure 1 has shown a screenshot of the GameSalad Creator.

This game is designed with a classic side-scrolling game in mind. The player will be in control of only the playable character. The game is designed around the playable character and an environment consisting of platforms. The platforms are in many shapes and sizes as well as properties. The platforms are shaped and arranged to create a game world for the playable character to traverse in. The game prototype snapshot has been shown in Fig. 2. The playable character is able to walk on solids such as platforms and the ground of the in-game environment. The image of the playable character is shown in Fig. 3.

The game environment scrolls left and right depending on the characters' position and moving direction. The camera tracks the playable character as it moves in the game. In essence, the playable character will always be in view. The playable is animated whilst idling and moving in whilst in the left and right direction. The playable character can "die" when the actor touches the sides of an in-game enemy or by touching other hazardous actors in the game. When the playable character actor dies, the current scene of the game is restarted for the player to try again. Essentially the playable character has only one life. This is common in traditional side-scrolling games.

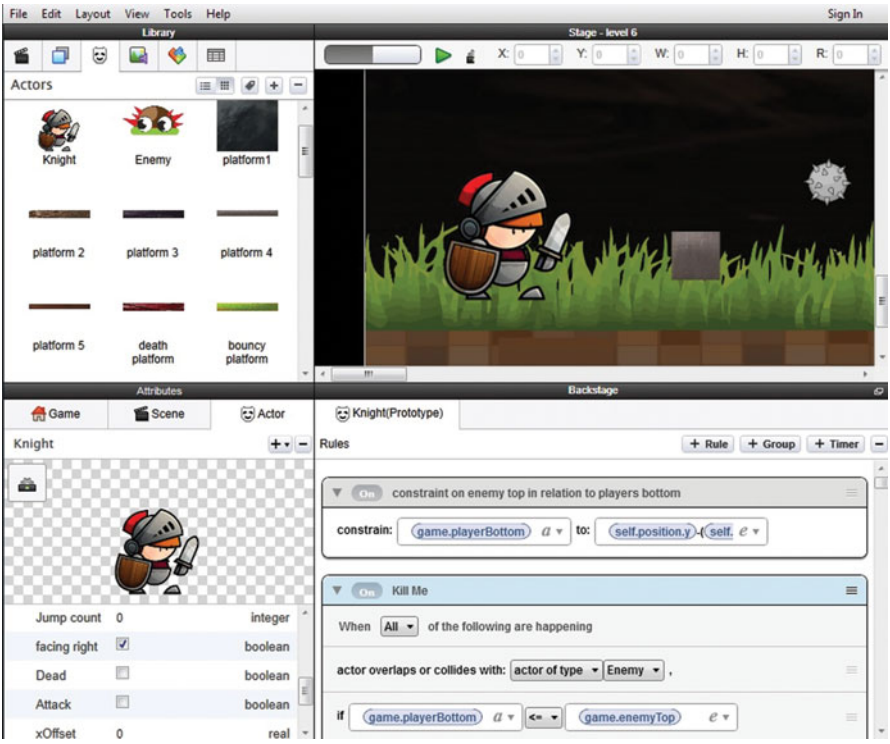

Fig. 1 GameSalad Creator screenshot for 2D side-scrolling game

Fig. 2 Game prototype screenshot

Fig. 3 Playable character

Fig. 4 English puzzle in the game

The game prototype has text and sound hints to help the player play the game. There is also some English text-based puzzle-solving elements in the game. Figure 4 is a screenshot of the English puzzle embedded in the game prototype. As shown in Fig. 5, the English text hints will appear in the game screen to help players navigate through the game. It also serves as a hint to the special properties of some actors in the game. The English texts are also persistent; they will appear on the game screen whenever the playable character actor is in the scene.

Sound plays an important in a game. English sound commentary in the game serves similar purposes as the text hints but in the output of English speech. A computer-generated voice is used to provide the in-game English sound commentary for actors in the game and hints in the game. The English sound commentaries will only play when the playable character collides with the invisible actor in which the commentary is bound to.

5 Evaluation Results

User acceptance testing is used to evaluate the functional effectiveness of the 2D side-scrolling game. This testing has been done by the game players. The user acceptance test is used to check whether the system meets the requirements. User

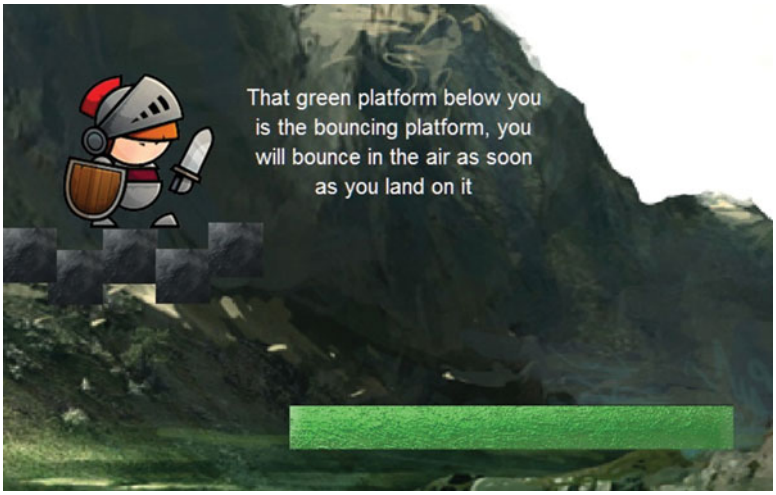

Fig. 5 English text hints in the game

Table 1 The test cases for testing the functional requirements of the prototype of this project

Source event (user action)	Conditions	Expected result	Pass
Move left/right	Playable character is alive	Character moves left by pressing the left key and moves right by pressing the right key	Yes
Jump	Playable character is touching the ground/ platform	The character jumps in the air	Yes
Double jump	Jump count attribute is not less than 0	Character jumps twice consecutively	Yes
Walk and jump on platforms	Platforms and playable character collision is true	Character is able to walk left/right and jump on platform	Yes
Kill enemy	Character must jump on top of enemy	Enemy is killed	Yes
English module: display text	–	Text is displayed clearly in game	Yes
English module: play sound commentary	Character collides with sound actor	Sound is played until completion	Yes

acceptance testing will be done for the functional requirements of the proposed prototype of this project.

All of the functional requirements were tested and all of the test cases in Table 1 have passed the testing. Table 2 is the test cases for user testing of various non-requirement functions in the prototype. All of the test cases in Table 2 were tested and passed. The prototype overall has no major glitch issues. Furthermore, the prototype is playing as expected without any major flaws in its gameplay.

Table 2 The test cases for other functions and elements of the various actors in the game

Source event (user action)	Conditions	Expected result	Pass
Kill character	Character collides with the actor death platform, spike platform, spike ball	Playable character actor is destroyed	Yes
Bounce character in the air	Character collides with the bouncing platform	Playable character bounces in the air	Yes
Drops character on the ground	Character collides with the falling platform	Playable character falls to the ground	Yes
Character rides up/down the vertical elevator	Character stands/collides on top of the vertical elevator	The vertical elevator rises up or drops down when playable character is on top of it	Yes
Character rides left/right the horizontal elevator	Character stands on top of the horizontal elevator	The horizontal elevator moves left/right when playable character is on top of it	Yes
Restart scene	Character collides with the "restart scene orb"	The game scene is restarted	Yes
Change to next scene	Character collides with the "next scene orb"	The next game scene is initiated	Yes
Teleport character to a position relative to the game scene	Character collides with the "teleport orb"	Playable character is teleported to a different location in the game	Yes

New electronic technologies have brought a revolution in the education system (Yacob 2007). A growing number of researchers are exploring the potential of digital games for engaging students in the learning experience (Squire and Barab 2004). DGBL should be integrated into the English teaching process to increase English learning and motivate students to obtain knowledge. Previous studies also show that GBL can increase student's learning skills, offer more learning opportunities and motivate students to study. Since educational games are entertaining, they can teach and change students' interest in studying (Liu and Lin 2009; Hwang et al. 2012). With the positive results of functional testing for the 2D side-scrolling game, we believe that GBL approach has the potential to overcome problems in English teaching and learning, especially for the younger IT generation students.

6 Conclusion

One of the limitations of the prototype is contributed by the game engine. GameSalad Creator only has a rectangle or circle collision shape. An intricate image placed in an actor may not have collision detection perfect to the image represented. For

example, the playable character has white space around the image and if a rectangle collision shape is selected, the white space is considered as a part of the actor. Another limitation of this prototype is the inconsistency of detecting the constrained attributes applied in the game. This is due to the glitch of the game engine and how it handles the attributes. The prototype would be more polished with a real human voice recording. As of right now, a computer-generated voice is used for the English sound commentary. A human voice recording would give a more polished and finished feel to the game. Other future enhancement would include the publishing of the prototype to the marketplace.

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A Survey Analysis: Students' Interest in Simplification Game Development Tools for Creative Learning

Seng Yue Wong, Wee Jing Tee, Sarojini Devi Nagappan, and Ka-Shing Sien

Abstract Game development tools and life cycles are complicated nowadays, creating barriers of entry for students and thus eliminating a potential creative platform for a majority of students. Students' attitude toward game development apparently are lack of interest. Creative potential among students remains largely untapped without a platform for creative development and engagement. Therefore, a survey analysis is conducted to identify current game development tools that can facilitate in the simplification of game development for students. Hence, students' perception on game development and their interest in engagement with it will be understood, and obstacles and hurdles they face in embracing it will be determined. Finally, the survey results will help to establish learning possibilities and solutions that can be incorporated into a university program from these tools that can invigorate creative talents of students. This paper will present literature reviews on game development-based learning and its application in education field. The analysis and findings from the survey on user's perceptions on applying game-based learning in education, their interest in game development courses and their perception of game development-based learning will be discussed. The specific features of game development tool are also evaluated and rated by the respondents. We hope the survey analysis can help to improve enrolment and reduce attrition rates from students as students are engaged in creative learning and content creation.

Keywords Games development • Simplification game development tool

1 Introduction

The recent trends in game development field can be categorized into three characteristics based on the challenges of learning game development in higher education (Jeon et al. 2012). To begin with, the time for the development of a game is getting really

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short. Second, up-to-date techniques such as 3D, network and multimedia are being applied to the game development. Third, a game engine is used to develop a game with high completeness in the aspect of stability. Hence, it is inevitable that education time should be constantly increased in order to conduct the game programming education according to the recent game development trends. However, at school, there is a certain amount of time for the education, and this makes it difficult to teach game programming with the latest technologies such as 3D, network and multimedia.

Moreover, students and beginners alike face a challenging task in development skills that will fill roles of various domains such as game programmers, 3D model creators, game designers, musicians, animators and playwrights (Wu and Wang 2012). These domains that are exposed to students are to serve as perfect catalyst for them to develop themselves creatively. Due to the complexity and time constraints of most game development lifecycles and tools, many students show little interest or effort in getting involved in game development, missing out on amazing learning opportunities. Simplification of game development whereby any student with no computing background can easily get into and start developing games will potentially change the way students learn and will serve as a catalyst for creative development if a modern and simpler form of game development framework can be introduced into higher education. The main contribution of this research is to present a game development framework (GDF) that can be used in higher education courses that may encompass software development and content creation.

Comprehensive evidence has been found that supports the introduction of game development in education through various forms of formats. The current gaps still remain on the research of visual programming game development tools that claims to improve development time dramatically by removing the technical aspects of game development. A game development guideline highlighted by Wu and Wang (2012) is an ideal model for the consideration of most game development courses that will be implemented and will thus be relevant for the conceptualization of a solution that will meet the simplification of the game development process for students within this research. The recent frameworks are identified that include commercially available options which cater a wider variety of audiences; this in turn requires the current research to work within the boundaries of the identified frameworks as oppose to a custom developed framework which can be based on our own specific requirements.

In this paper, we will present the background of this study, gaps we found in game development learning and research objectives and method. Then, we will view the results of the study and discussions on it. At the end, a framework will be proposed.

2 Research Background

From our literature reviews, we have found some gaps between students and game development learning. First, game development tools and lifecycles are very complex nowadays, creating barriers of entry for students and thus eliminating a

potential creative platform for a majority of students. This scenario posted challenges and barriers to students and hence makes it difficult for them to engage themselves in creative learning. This inhibits students from creatively exploring alternative game ideas and improving their overall end product which they are trying to achieve. It does not help that developing games now has also ballooned in complexity when project size and problems due to highly domain-specific requirements are taken into consideration.

Second, students' mindset towards game development is closed and they generally lack interest towards it. Students have a decreased appeal in computing as a field of study or a future career, let alone game developing. Many existing students choose to change their major after taking a few computer science courses because they perceive the course material as dry and having no relevance to the real-world applications (Beaubouef and Mason 2005). It is therefore important to provide an attractive entry point for students to enter into the computing field. Students are allowed to engage quickly in creative game development that can review how fast production cycles that attract students by seeing real-world results as soon as possible.

Third, creative potential among students remains largely untapped without a platform for creative development and engagement. Recently, students who are engaged in the computing field of studies are limited to programming and conceptual learning of theory of computing knowledge, hence making it sometimes dry and not applicable to the real world. As such, a program that focuses primarily on simplified creative game creation and learning is essential for the active participation of students as teaching methods based on games are not only attractive to school children but also to university students (Sharples 2000). Researchers in areas related to gaming have identified unique skills and competencies that are needed for students wishing to pursue computer science and especially gaming as a career. These areas include obtaining an appropriate level of education, having experiences, developing problem-solving and communication skills, developing software and programs and supporting knowledge in areas associated with computer technology, math and graphics (McGill 2008).

A new game development framework that can inspire students to pursue gaming can ultimately ignite this passion for game development and engage themselves more thoroughly in the field of computer science. Students who partake in this new framework will have the opportunity to learn gaming through unconventional means such as visual programming which eliminates challenges when it comes to language-specific issues. A new framework would allow students to be at the forefront of learning and hence bring new excitement computing field of study. Having a program which is exciting, new and, most importantly, relevant to students for a computing school will help improve enrolment and reduce attrition rates from students as students are engaged in creative learning and content creation.

3 Survey Methodology

To achieve our study objectives, we had conducted a survey in Taylor's University. The survey is an electronic questionnaire form and filled out by respondents themselves. The data from the printed forms was transferred after completion to the electronic platform. The survey was implemented using Google Forms. The survey was shared out through social media such as Facebook (posted in social circles such as the Taylor's School of Computing Group, which included all students from the School of Computing in Taylor's University) and through offline means which involved approaching students in labs and the library. The total number of respondents for the survey was 155.

The main aim for the survey was to determine the stance of students (potential game developers) towards game development classes. The survey is substantiated on the premise that its results can help improve the quality of computer game design courses by implementing a relevant framework that is ideally simple for the novice or beginner who is interested in game development and make their learning outcomes more compatible with their desires for creative development.

The survey consists of up to four parts: background information, thoughts, perceptions, and a fork path which is either consisted of the third part or fourth part which respondents answered if they were interested in a game development course or just a third part if they were not interested in the game development course. The first part which contained six questions regarding their background information helps identify the current demographics taking the survey and helps identify the respondent's current exposure towards game development and game-based learning activities in education. The second part of the survey contains four questions regarding their thoughts and perceptions of game-based learning and game development. Within the second part, a question is asked regarding their interest in participating in a game development course, which will determine the direction of the survey.

For respondents that said yes, the third part of the survey contains four questions regarding a game development course structure which they will be interested in, as well as identify their motivations for participating in a game development course. The fourth part of the survey contains three questions regarding game development tools which they will use with one question requiring respondents to identify the importance of certain aspects of game development tools which they value higher than others. As for respondents that answered 'No' to their interest in participating in a game development course, they will be directed to a different part of the survey which contains three questions regarding the reasons and factors a game development course does not appeal to them. Two questions provide a list of factors for respondents to choose from which cover a wide range of most common reasons.

4 Results and Discussion

The first part of the survey involved asking questions about the respondent's background information. The background information of interest in the survey is as follows:

- Gender
- Their current level of studies
- The school in which they studied in
- How often do they engage in computer or video games
- Whether or not they have contributed to the creation or development of video games
- Whether or not their current school engages them in game-based learning activities

In this survey, majority of the respondents were male, while 25 % of the respondents were female. Majority of them are currently undergoing their second year of undergraduate studies at 37 %. Third year and first year students came second and third with 26 % and 17 %, respectively, while foundation students made up 8 % of the overall respondents. The survey also included graduate students who were interested in filling out the survey; they make up 7 % of the group, while fourth year students who are mainly reserved for engineering students made up the final 6 % of the respondents.

The games referred to in the survey ranges from any form of game, be it mobile or computer. Most of the respondents in fact have been exposed to video games and are still actively engaging in this form of entertainment with 43 % of the respondents playing computer games on a regular basis and 41 % of the respondents playing computer games occasionally. They form 83 % of all respondents which shows there is big demand for entertainment in game-based platforms by a lot of students. The remaining group of students either barely play or do not like playing video games in general, comprising of just 13 % and 3 % of the group.

The question refers to a respondent's participation at any stage of development of a game, whether it be development, content creation, multimedia design or testing. The results show that in fact 68 % of the respondents have not generally been exposed to game development or anything relevant to it. The common reasoning would be that opportunities for engaging in game development are few and far in between, unless they actively seek out development work for games, which can be seen in the 32 % of the respondents who in fact have contributed to game development by their own initiative.

From the analysis, a large percentage of respondents (72 %) identified that their current program or school does not incorporate game-based learning activities in their curriculum. The data shows a general exposure of respondents towards game-based learning; it is important to note that from the survey, certain students from the same school did in fact undergo game-based learning activities depending on the subject they are taught. On the other hand, about 28 % of respondents did in fact

have game-based learning activities practised within their schools. From the data, it shows that in general, many schools or programs do not infuse game-based learning elements in their syllabus.

In the second part of the survey, we identify the respondent's thoughts on game-based learning and game development. The questions come in the form of a scale and multiple selections for respondents to select. Finally, we ask a question that will determine the next part of the survey the respondent will proceed: If respondents answer 'Yes', they will proceed to parts inquiring about a game development course and the development technology. If respondents answer 'No', then they will be directed to a part inquiring about the factors deterring them from game development and factors that may change their mind. This section will include the following four questions:

- Do you believe that game-based learning is a viable teaching tool for classrooms?
- What are your current thoughts on game development?
- How strongly do you agree that game development is a viable tool for creative learning?
- Would you be interested to join a game development course?

The first question is used to identify the respondent's view point on game-based learning as teaching tool in classrooms. The respondents are presented with a scale between 1 and 5, 1 being strongly disagree and 5 being strongly agree with the notion of game-based learning being a suitable teaching tool for classrooms. Figure 1 shows the results of the notion of game-based learning as a viable teaching tool. The results have indicated that most of our respondents generally view game-based learning as a

Fig. 1 Results of notion of game development as a viable teaching tool

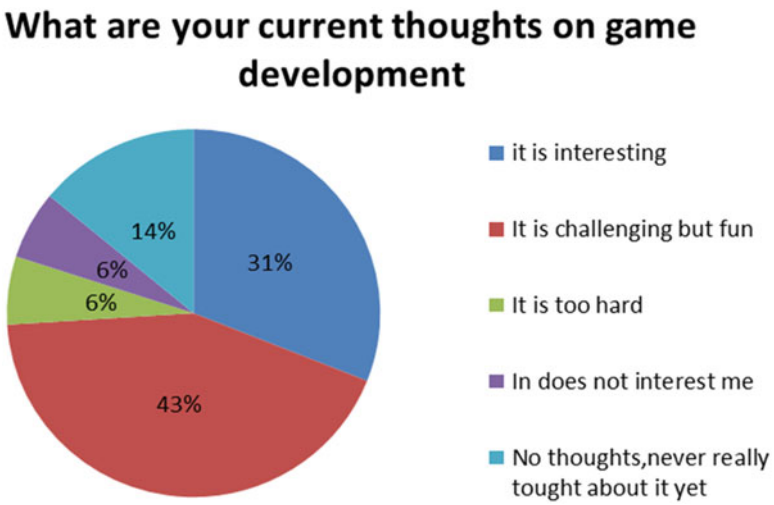

Fig. 2 Results of current thoughts on game development

viable teaching tool for classrooms; this is shown in the respondents who choose 4 (51 %) and 5 (21 %) which when combined add up to about 72 % of respondents who either agree or strongly agree with this notion. This shows acceptance of a large portion of respondents who believe that incorporating game elements into the syllabus can help with their learning objectives. On the other hand, about 25 % of respondents neither agreed nor disagreed with the notion and only 2 % of the respondents either disagreed (1 %) or strongly disagreed (1 %) with the notion.

The purpose of the second question is to identify how the general public represented by our group of respondents perceives the topic of game development. Figure 2 presents the results of current thoughts on game development. The respondents are provided with a list of five choices in which only one selection about their thoughts on game development is made. The topic on game development is largely viewed by many of the respondents as a challenging task, but fun process (43 %). This group is followed by another group of respondents who found the whole topic of game development interesting (31 %). This shows an overall positive perception towards the topic with an overall combine group of 74 % of the respondents. For the remaining respondents, one group had no thoughts on the topic making up 14 % of the group, while groups of respondents that felt that the topic was too hard or not interesting stood at 6 % each.

With the previous question identifying the perception of game development of the respondents, the third question then adds on and identifies how viable as a tool is game development for creative learning. Figure 3 shows us the results of students' perception on game development as a viable tool for creative learning. We can see that a large number of respondents agreed that game development is a viable tool for creative learning, making up 55 % of the responses, while another group of respon-

Fig. 3 Results of students' perception on game development tool as a viable tool for creative learning

dents strongly agrees with this notion, making up 22 % of the responses. This means that a total of 77 % demographics view game development as a positive tool for creative learning, believing that through game development, participants are able to bring out their creative nature through the process of game development. There is also a group of respondents who neither agreed nor disagreed on the notion, forming 21 % of the respondents. Only 2 % of respondents disagreed with the idea that game development can be used as a viable tool for creative learning. None of the respondents strongly disagreed with the notion.

The previous questions within this part have identified that game development is perceived as a positive process by respondents and many of them felt that it is a viable tool for creative learning. The fourth question identifies, given the current thoughts on game development of the respondents, whether they would be interested in participating in a game development course. The results have shown that 66 % of respondents are interested in participating in a game development course. Although 77 % of the respondents felt that game development is a viable tool for creative learning, not all of them felt that they would be interested in joining a game development course. However, the current results indicate that a large number of respondents are interested in the game development process and are willing to participate in a course if one were to be presented.

If the respondents agreed with question 4, interest in game development course, they will proceed to some questions in part 3. There are various methods of which a game development course can be implemented within schools. Previously we have respondents from 11 schools as well as other faculties and universities. These questions provide few options for game development course structure that they find most

appealing to them by given their current background and school. From the survey, most of our respondents preferred a game development course to be in the form of an elective subject (35 %). Respondents also favoured if the course was introduced as an external workshop (32 %). Both these two options indicate that respondents prefer the flexibility of choosing this course and participating in it on their own time, whereas 16 % of the respondents preferred it as a core subject which is mandatory for all students to take. Another 16 % of students believe in e-learning and hence favoured an online option as well for a game development course that is purely online. Within the course, the two highest voted types of classes were preferred by respondents, that is, laboratories to implement a game (42 %) and collaborative exercises for game design and creation (42 %).

There are 58 % of the respondents who prefer collaborative workshops leading to design of a real game as the most attractive form of classes. Case studies of existing games and a laboratory to implement a game were found to be equal in respondent's acceptance at 19.5 %, while the remaining 3 % preferred a lecture on game design theory. From the survey, 31 % of the respondents are interested to participate in a game development course to further pursue their ambitions of a game designer. This falls in line clearly with the creative aspects of game development where respondents are interested in the conceptualization of the game. Another group of respondents opted game developer as their career path after joining a game development course, forming 29 % of the group. Interestingly, 22 % of the group were not interested at all in the whole business of game development and were more interested in gaining the knowledge of the process. The last group of respondents opted to be video game reviewers (18 %) even though technically one does not require a game development course to review video games.

Besides that, the survey also shows that 35 % of the respondents enjoyed the fact that a game development course can allow them to work and play at the same time. This enables them to play their own games while working on—it seems to be an attractive incentive for many of the respondents. Following that group are respondents who believed that through a game development course, they can learn the skills to make any of their dreams come true, especially if it is being a game developer they have in mind (30 %). These two results are supported by statistics discovered by Skrzyszewski and other researchers (2010), which also show a common universal trend in the intrinsic desires of students when participating in a game development course. The last group of respondents (8 %) felt that through a game development course, they will be able to add their credentials to a triple A title 1 day in the future for portfolio purposes.

For those who disagreed with question 4 in part 2, they will proceed to three questions to identify the reasons or factors that have shown why they are not interested to join in game development. Majority of the respondents felt that the lack of interest in game development was their primary factor for not joining in a game development course. This is followed by the lack of time (18 %), since most of the respondents are caught up with their current studies and assignments to allocate time for a game development course. Uncertainty of the subject and the lack of an idea for a game to begin with had both formed 17 % of each group. The remaining group of respondents felt that game development was too complex (12 %). Certain

groups face external factors such as monetary (6 %) and lack of peer support (1 %) to encourage them into a game development course.

Furthermore, the results also show the majority of the respondents (62 %) felt that the factors they have identified in the previous section are permanent, which means the lack of interest in game development will never be changed in their opinion. On the other hand, 32 % of the respondents felt that the factors that currently affect their decision will change in time given the right conditions and circumstances. The results show that majority of the respondents will participate in a game development course only if it is a requirement (20 %). This means unless they are forced to participate, they will otherwise not be interested in joining it. This is followed by an easier development cycle at 19 %, which means if they had a choice to join in game development courses, the development process should be easy and simplified. The next factor involves the respondents' own research on the subject of game development at 17 %, where the uncertainty of the subject may deter them from participating in the course. Some respondents also felt that an increase in market demand from employers will help to encourage them in participating game development course at 16 %. Monetary incentives and popularity of game development earned 10 % of the respondents' vote each. The factor was peer support, where some respondents felt that they needed the support from their friends before they will participate in a game development course.

The game development tool or framework of preference was also evaluated by respondents by requiring them to rate specific features of a game development tool in terms of importance. The summary of the results is shown in Table 1 in order of importance. From the data, respondents rated ease of use, community support and multi-platform support of a game development engine as their three most important features, while version control, analytics and monetization features are rated as not particularly important.

Table 1 Summary results for specific features of game development tool

Feature	Important	Somewhat important	Not important
Ease of use	81 %	17 %	2 %
Community support	66 %	31 %	3 %
Multi-platform support	64 %	33 %	3 %
Customer support	64 %	32 %	4 %
Advanced features	57 %	38 %	5 %
Tutorials/training	55 %	39 %	6 %
Mobile support	48 %	35 %	17 %
Price	42 %	44 %	14 %
Console support	40 %	47 %	13 %
Documentation	40 %	44 %	16 %
Asset support	39 %	56 %	5 %
Version control	37 %	52 %	11 %
Analytics	30 %	56 %	14 %
Monetization	27 %	60 %	13 %

5 Conclusion

The data that has been collected showed interesting trends in user's perceptions on applying game-based learning in education and their interest in game development courses. We see a large portion of respondents (72 %) who have not been exposed to game-based learning in their schools or program, showing a slow development and propagation of this form of learning in most of the schools for Taylor's Lakeside University. However, students' perception towards game-based learning is surprisingly positive with 72 % of the respondents agreeing that it is a viable teaching tool for classrooms. This reduces the barrier of resistance when game-based learning is introduced in schools as a large portion of students are open to the idea that it is in fact an effective tool to be implemented in classrooms. Finally, we hope the survey analysis can help to improve enrolment and reduce attrition rates from students as students are engaged in creative learning and content creation.

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Taylor's University Lakeside Campus: Application and Effectiveness of e-Learning Tools for Students' Learning Activities

Seng Yue Wong, Wee Jing Tee, and Wou Onn Choo

Abstract Electronic learning has emerged as one of the most popular pedagogical concepts early in the year 2000. Many studies and researches have been conducted and the lack of technology availability causes its effectiveness in teaching and learning. However, the recent new technology and innovation tools can be fully utilised to fill up this gap. Blended learning which adopts a strategic and systematic implementation of technology combined the best features of face-to-face interaction to integrate different mode of delivery, teaching models, learning styles within teaching and learning environment. This paper will discuss on how to apply e-learning tools for students' learning activities and assessment. Examples of Socrative and Padlet conduction will be presented. Then, we present effectiveness testing methodology on these e-learning tools. Furthermore, we did a result analysis of e-learning tools' effectiveness and discuss how these e-learning tools help to conduct learning activities and assessment in our blended learning system.

Keywords e-Learning tools • Blended learning • Assessment

1 Introduction

Electronic learning (e-learning) has significantly enriched students' learning and experience and allowed much flexibility to ubiquitous learning. However, a great fear among educators or instructors is that this human interaction in online environment leads to more alienation between students and teachers and less meaningful communication among students and teachers (Ko and Rossen 2010). E-mail, discussion forum, online chatting, video conferencing and other tools are e-tivities that are always utilised by students and teacher to communicate to each other for

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learning purposes. E-tivities enable enjoyable, cheaper and productive online learning for students (Salmon 2013). They are designed by instructor and able to engage students to participate actively and thus promote active learning or collaborative learning among students.

In Taylor's University Lakeside Campus, we had implemented e-learning system, named Taylor's Integrated Moodle e-Learning System, to manage all online learning class, learning management system (LMS), online assessment, online learning activities and many online tasks for virtual learning environment. Due to less meaningful communication problem if we teach entirely online, there is a need for strategic plan for full-scale implementation of blended learning, which means combined e-learning and face-to-face learning together. This mode is also not widely adopted in many higher education institutions (Cheung et al. 2010).

Besides less meaningful communication, many educators also worried about online assessment tools that are used in e-learning system. Without face-to-face meeting, the instructor is just being there sporadically, at the times when they log on, whereas the students may post their comments at any time of the day. Indeed, online learning depends heavily on the engagement and participation of students. If they failed to involve our design learning activities, it is meaningless to teach online. As an instructor, we need to step back a bit to reflect what we did is suitable, and we should design or fully utilize the online assessment tools to improve our teaching and promote efficient student learning in the future.

Assessment is a process of collecting and interpreting information or evidence of learning. We should know how important are set learning outcomes and plan our assessment for our teaching in the school. Constructive alignment is crucial, which will match with students' learning level. Therefore, we need to design a good content for students to achieve the learning outcomes. At the same time, we need to design a plan for assessing students' achievement of learning outcomes and support students' learning. There are few e-learning tools that have been used in our school to engage students especially for student assessment, which are TodaysMeet, Padlet and Socrative. In this paper, we will do some reviews on how we design and conduct online learning activities and assessment via these tools. Next, we present effectiveness testing method and result analysis on the effectiveness of these e-learning tools. Finally, we discuss some impacts of the testing results in our blended learning system.

2 Application of e-Learning Tools for Students' Assessment

What types of learning activities are most effective for online learning or blended learning? In this section, we review some guidelines to design suitable activities and suite for students' assessment. Online learning represents a considerable opportunity for universities to promote larger and more democratic access to intellectual resources, reducing the social gap which is often related to on-site learning (Ravanelli and Serina 2014). Several studies that demonstrate the perception of students provide valuable insights into the aspects of teacher practices which may in

turn affect student behaviour (van Beek et al. 2014). We also present some concrete examples of e-learning tools for students' learning activity and assessment that we found to be effective, and we show how we apply, organise and later evaluate their effectiveness.

Generally, it is a must for the teacher to play a role in dividing students into groups because grouping students may be difficult, confusing and irritating for students when they simply form groups and left their own devices behind. In blended learning, students have mostly known each other from face-to-face session and get opportunity to form groups. The size of the groups should not be too large and may vary based on the tasks. Total members for discussion purposes can be ten and above; however, four to five members are the optimum size for group assignments (Ko and Rossen 2010).

Next, instructor or teacher may not participate in group activities, but their guidance and supervision will encourage students' participation, and the need to ensure individual's contributions to the group is recognised. Some instructors may ask group members to evaluate each member of the group, by using a well-defined set of criteria and rubrics of assessment (Ko and Rossen 2010). This extra input can assist the instructor to discern what each student has contributed to the group efforts.

As mentioned in the Introduction, we had applied two e-learning tools for students' assessment and learning activities, Padlet and Socrative. Padlet is a tool that enables the teacher to use drag and drop method to create assessment questions to the students and view students' answers on the wall constantly. This free tool enables teacher to post assessment questions on the creative wall, with fun backgrounds and colourful and gorgeous interface, and students can answer and post it on the wall immediately. Figure 1 has shown a snapshot of Padlet interface where teachers are conducting assessment to their students. Besides assessment tools, Padlet also can be used for learning activities in the classroom. Students and teacher can post image, photo or video link to each other for learning activities.

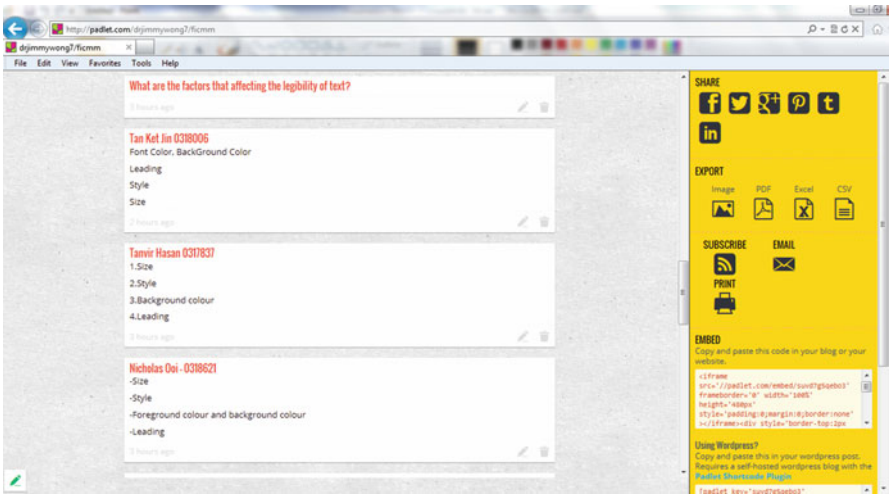
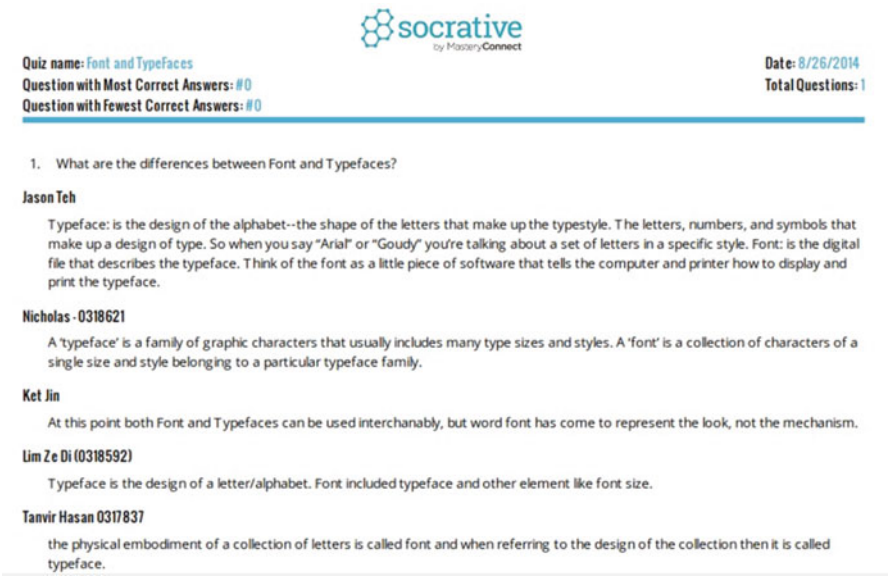


Fig. 1 Snapshot of Padlet interface for conducting students' assessment

Besides that, Socrative is another free tool that engages students and enables teacher to assess students with educational activities on tablets, laptops and smartphones. Instant result aggregation and visualisation via the use of real-time questioning in Socrative help teacher's online learning or blended learning become enjoyable and collaborative. Figure 2 has illustrated an example of students' answer in Socrative, and students' progression can be kept track as shown in Fig. 3. Same as Padlet, Socrative also can be utilised to conduct learning activities in face-to-face learning session.


socrative
by MasteryConnect

Quiz name: Font and Typefaces
Question with Most Correct Answers: #0
Question with Fewest Correct Answers: #0
Date: 8/26/2014
Total Questions: 1

1. What are the differences between Font and Typefaces?

Jason Teh

Typeface: is the design of the alphabet--the shape of the letters that make up the typestyle. The letters, numbers, and symbols that make up a design of type. So when you say "Arial" or "Goudy" you're talking about a set of letters in a specific style. Font: is the digital file that describes the typeface. Think of the font as a little piece of software that tells the computer and printer how to display and print the typeface.

Nicholas - 0318621

A 'typeface' is a family of graphic characters that usually includes many type sizes and styles. A 'font' is a collection of characters of a single size and style belonging to a particular typeface family.

Ket Jin

At this point both Font and Typefaces can be used interchanably, but word font has come to represent the look, not the mechanism.

Lim Ze Di (0318592)

Typeface is the design of a letter/alphabet. Font included typeface and other element like font size.

Tanvir Hasan 0317837

the physical embodiment of a collection of letters is called font and when referring to the design of the collection then it is called typeface.

Fig. 2 Example of students' answer for students' assessment in Socrative

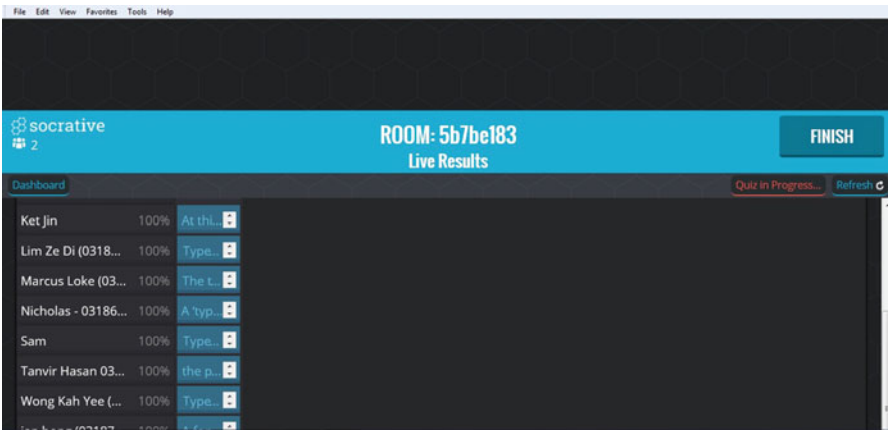


Fig. 3 Snapshot of students' progression in Socrative

Discussion forum in TIMeS can be used for learning activities and students' assessment in online learning. This tool seems like a traditional tool, but it still can be used online, and it is a less creative, more formal and text-based activity.

3 Effectiveness of Testing Method

To evaluate the effectiveness of e-learning tools as assessment tools, the researcher had carried out interview with the students to gather qualitative information on this. Nineteen students from the School of Computing and Information Technology, Taylor's University Lakeside Campus, are respondents for this effectiveness testing. Besides interview to gather more information, the researcher also asked the testing questions via Socrative. Two questions have been asked to students:

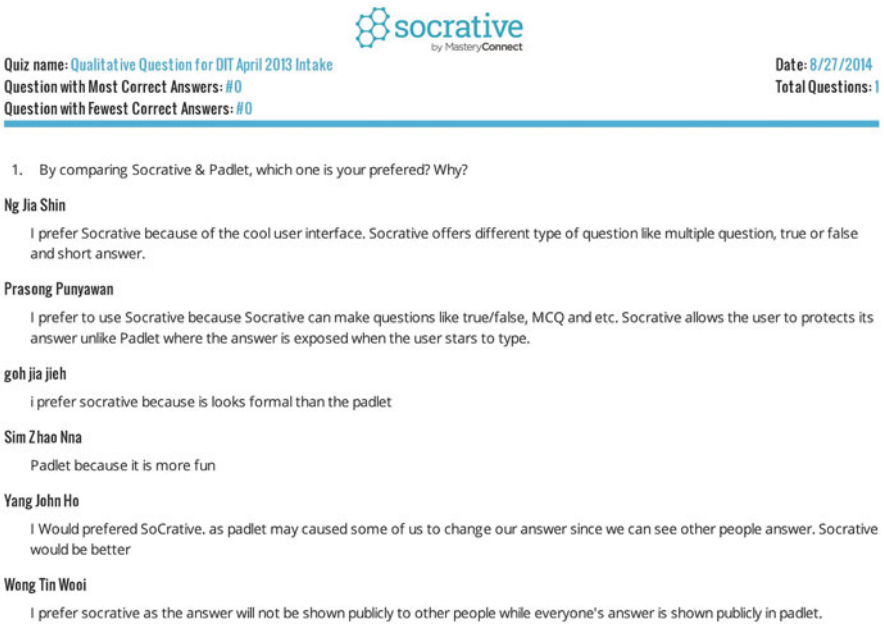
(a) By comparing the Padlet and Socrative, which one is your preferred tool in our class assessment? Why?
(b) In your point of view, what is the best tool for conducting the online learning activities? Socrative? Padlet? Forum? Others? Why?

Students' answers are collected via Socrative and will be shown in the next session, Results of Effectiveness Testing on Students' Assessment Tools.After answering the questions, the researcher had one-to-one interview session to obtain further information on the effectiveness of the e-learning tools that had been used in online learning or blended learning.

4 Results of Effectiveness Testing on Students' Assessment Tools

The effectiveness testing shows that 17 students preferred the use of Socrative as assessment tools, that is, 89.5 % of the respondents like to use Socrative for assessment and quizzes. The reason given by them is mostly because of privacy—other students cannot view each other's answers in Socrative. Padlet can let each other view answers on the wall. They also stated that Socrative looks formal than Padlet for the interface and can be used for different types of assessment questions, such as multiple-choice questions (MCQ), true or false questions and short-answer questions. This assessment tool can be carried out in real time and flexible to use; it is simple and saves time. Figure 4 has shown some example results given by the respondents via Socrative.

However, Padlet is the most popular and preferable tool for e-learning activities. Nineteen respondents give the same answers and preferred to use Padlet for conducting e-learning activities. They choose this because of its high interactivity and funny and colourful background at the activity wall. They are able to post their


socrative
by MasteryConnect

Quiz name: Qualitative Question for DIT April 2013 Intake
Question with Most Correct Answers: #0
Question with Fewest Correct Answers: #0
Date: 8/27/2014
Total Questions: 1

1. By comparing Socrative & Padlet, which one is your prefered? Why?

Ng Jia Shin

I prefer Socrative because of the cool user interface. Socrative offers different type of question like multiple question, true or false and short answer.

Prasong Punyawan

I prefer to use Socrative because Socrative can make questions like true/false, MCQ and etc. Socrative allows the user to protects its answer unlike Padlet where the answer is exposed when the user stars to type.

goh jia jieh

i prefer socrative because is looks formal than the padlet

Sim Zhao Nna

Padlet because it is more fun

Yang John Ho

I Would prefered SoCrative. as padlet may caused some of us to change our answer since we can see other people answer. Socrative would be better

Wong Tin Wooi

I prefer socrative as the answer will not be shown publicly to other people while everyone's answer is shown publicly in padlet.

Fig. 4 Some examples of qualitative results for question 1 via Socrative

answers in real time and can view others instantly. They feel faster while they are using Padlet to answer questions and the answers are editable. One of its disadvantages is that students can register any name to log on and carry out the learning activities, low security and privacy.

Students also commented for forum tool which is used in e-Learning system, besides Socrative and Padlet. They rather not using forum as this tool is not user-friendly, out-dated design, not organised, text-based activity without any animation or multimedia elements, bored and static interface design. The researcher had an experience with the students feeling bored when they attended lecture and tutorial session. When they feel bored, they were not following what the teacher taught and discussed in the classroom. They totally did not pay attention and cannot concentrate on the teaching and learning process. They cannot learn well although revision and discussion are continuously conducted in every teaching and learning session.

Hence, “engaging” and “active learning” are two important features to solve these problems in classroom activities. We need to engage students to participate actively in teaching and learning classroom. When they are active and enjoy the learning activities that had been offered to them, they will learn something. Instant

feedback, real-time questioning, instant and visualised discussion will help the teacher to engage students in the teaching and learning process, especially for those lectures are more to facts than practicals. These learning tools let us organise, share and develop our ideas and brainstorming faster, easier and more fun! That is why we strongly agree that these e-learning tools can help teachers increase students' engagement in face-to-face session and promote active learning in classroom. Active participation in an enjoyable learning session is really helpful to increase and enhance students' learning.

Moreover, these e-learning tools also provide focus and chance for interaction and increase motivation, and students understand more complex concepts through visual presentations. These advantages can lead to deeper learning and promote metacognitions. When the students are given real-time questioning (from lower learning level until higher learning level), students need to think first before answering the questions and indirectly promote their higher thinking level. Some questions need students to do deeper thinking until they obtain the correct answers. From here, we can conceptualise learning as collaboratively co-creating knowledge, via cooperative, peer-to-peer, informal learning and interaction by utilising these e-learning tools. The teacher actually plays a key role in dialogue and interaction between students. With these tools, immediate reporting and respond or feedback system, students and teacher will gain all these benefits.

5 Conclusion

Blended learning should be adopted in Taylor's University to enhance the quality of student learning experience, enrich students' learning experience, facilitate leading practices and innovative approach to teaching and learning and provide flexibility of provision to support a diverse student population. Blended learning should be explored in higher education with scheduling and support. The lectures have been taught in X-space, the future smart classroom in Taylor's University. This classroom is purposely designed for flexible formal learning to facilitate a diverse learning experience in a highly collaborative and engaging manner. This will promote collaborative learning in classroom. The designed spaces are most suitable and comfortable for them to have discussion and online searching to answer tutorial questions. With the advantages of X-space, these learning tools, such as Socrative and Padlet, provide us opportunities to do collaborative learning because they let us do instant discussion, real-time questioning and instant results, instant feedback and personalised learning and produce report about students' progress.

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Design Model for Integrating Learning Activity Management System (LAMS), Massive Open Online Courses (MOOC) and Flipped Classroom in Taylor's Integrated Moodle e-Learning System (TIMeS)

Seng Yue Wong, Wee Jing Tee, and Pui Voon Lim

Abstract The e-learning strategic plan for Taylor's University is being much student centred and focuses on intentional learning. Blended learning has been proposed to apply in Taylor's University to enrich students' quality via interactive learning activities beyond those attainable via face-to-face classroom interactions. The goal for application is that students will learn in a collaborative, self-directed and personalised manner anytime and anywhere. Therefore, we propose a design model which is integrating Learning Activity Management System (LAMS), Massive Open Online Course (MOOC) and Flipped Classroom in Taylor's Integrated Moodle e-Learning System (TIMeS). In this paper, we will present literature reviews on these three approaches and their impacts in the e-learning field. The features of LAMS, MOOC and flipped classroom will be discussed and applied in the new design model for the e-learning system in Taylor's University. With the recent development of technology, we hope that the model can be used as guidance in implementing blended learning in Taylor's University. Further evaluation studies and reflective reviews need to be conducted for its effectiveness and efficiency in teaching and learning process in TIMeS.

Keywords LAMS • MOOC • Flipped classroom

1 Introduction

Disruptive innovation is an innovation that disrupts the improvement trajectory by bringing their products and services to the market that are always simpler, cheaper, unimportant and easy to use becoming highly valued among the nonconsumers.

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Disruptive innovation enables companies to improve their services and products little by little and become acceptable by majority of customers and manage to survive in the new market. Typically, disruptive innovation produces more simple, affordable and customisable products and services to the consumers. Consumers can select what they want and able to get what they want. There is always a minor change by the disruptive innovation and not very vital at early stage will become winner in the market at the end because it meets the majority of the requirements from the user. They will be successful in the market in the future because it can be personalised, customised and utilised by all with no boundaries of place, time and cost. Disruptive innovation always can show the difference of measure performance. Online learning or e-learning is one of the examples of disruptive innovation that happened in the educational field.

Online learning offers ubiquitous learning among students as well as freedom to study. Students can search courses via the Web, scouring their institution for programmes, classes and instructors that fit their needs (Ko and Rossen 2010). Besides that, students are also using mobile devices, such as iPhone, iPad and smartphones, to communicate and collaborate with instructors and classmates, gathering in computer labs to connect with university resources. However, online learning still has some issues related to handling technical problems (such as lack of communication in face-to-face session), platform operations, tense environment in classroom session and students' passive attitude and engagement in classroom tasks (Marco et al. 2013). With all these freedom and innovation given by online learning, can conventional tools of teaching be removed from the teaching and learning system? No, students and teachers still lack skills in learning interactions, electronic skills, content design and automation of assessment (Selvi and Perumal 2012; Marco et al. 2013). Why does advanced and fruitful technology nowadays still meet these problems to integrate in our teaching and learning system? There are uncountable studies that were carried out to prove this and there are significant studies related to this. Thus, blended learning or hybrid learning has been introduced to combine both face-to-face session and online activities.

Taylor's University is utilising Taylor's Integrated Moodle e-Learning System (TIMeS) as a learning management system (LMS) or known as virtual learning environment (VLE) for all courses. This system enables instructors to post or upload lectures or graphics, moderate discussions, invoke chat sessions and give quizzes to the students. Instructors and students not only can manage their flow of information and communications but also can access and keep track of the performance of the students, monitoring their progress and assigning grades. The strategic plan that is needed by Taylor's University is more towards student-centric, integrated, different modes of delivery, teaching models and teaching styles within the teaching and learning environment.

Most of the schools provide lecture-based learning to students. Students may learn well in this type of learning. However, some students cannot master their skills or knowledge to proceed to the next level of learning. The future of the e-learning system may move towards personalised and self-organised learning. Mastery learning and active learning approaches may help this transformation. In this paper, we

will do some reviews on Learning Activity Management System (LAMS), Massive Open Online Course (MOOC) and flipped classroom. Then, we will propose a design model which is integrating these three system features to be embedded in TIMeS. We hope that the proposed model can be utilised as guidance to implement blended learning in Taylor's University.

2 Literature Review

2.1 Learning Activity Management System (LAMS)

The Learning Activity Management System (LAMS) enables teachers to design the learning activities in a sequence. Students can access the activities via LAMS either in single work or group work. They can do these activities synchronous or asynchronous. They can be evaluated by teachers and their status of learning activities also can be monitored via LAMS. Response can be given immediately if the activities are conducted synchronously. These activities will be more attractive, increase engagement, save time and cost of teaching and make our course become productive and fun. If compared to text-based activity such as chatting, forum or bulletin board, LAMS can provide more activities than these and make it become a variety. The important feature here is the embedding of pedagogical and learning theories in our designed learning activities via LAMS. We can monitor our students whether they do well, correct or not, in the learning activities. LAMS really provides us the opportunity to enable our students to study and learn well via a sequence of learning activities. Most of the students will do well if we implement a reward system together.

LAMS is an advanced learning management system (LMS) that provides advanced tracking and assessment features via learning activities besides learning contents, with three main modules, which are authoring, learner and monitoring. The authoring module is used to design our teaching-learning plan based on the sequencing of different learning activities (de Blanco et al. 2010). The sequence of learning activities is named learning design (LD). The "design" of learning activities is also important. The sequenced and structured learning activities in a learning flow can promote more effective learning (Britain 2004) because these sequence of activities can be formally described and captured, stored, shared, reused and adapted (Dalziel 2005).

The learner module is used for execution of designed sequences of learning activities by students. Some learning activities can be conducted in groups if the teacher plans for a group activity. This is vital to promote collaborative learning and hence increase learning among students. Sometimes, the strength of collaboration can make students learn well via group-based assignments, chatting or forum. This is because they can discuss, think and solve a problem together via group discussion. All these are learning activities that activate our e-learning system. The monitoring view module enables the teacher to track and monitor the students' progress

via the learning activity sequence. This is the main and vital feature and this is why we need to implement LAMS in our school e-learning system. These are the advantages that can be obtained from LAMS to fill up the gaps the recent e-learning system lacks in learning activity management and efficient e-learning assessment tools together. Now, they can use LAMS for game-based learning assessment too (de Blanco et al. 2010).

2.2 Massive Open Online Course (MOOC)

Massive Open Online Course (MOOC) is an online course which can be provided to unlimited participants via the Web. According to the latest report until June 2014 from the Open Learning website, there are 42,109 students that use it and monthly hours spent can achieve to 130,854 h ("openlearning.com" 2014). This report is to show that MOOC is becoming more popular and easy to access by the public. The features and services that are provided by MOOC meet the majority of public needs and become disruptive innovation in educational field. Firstly, MOOC is free to use and provides open content to all registered students. It can be accessed by all and is easy to use. Students just need to register in the Open Learning website and they can learn what they want and what they like to learn. Simple steps to follow and cheaper ways to use MOOC can let students to learn what they want, such as develop a simple game. Secondly, MOOC can offer different courses to teach students. Students can choose what they want to learn and get what they want to learn without the boundaries of programming skills and time. This means that MOOC can offer the diversity of courses via teaching videos. Thirdly, MOOC is able to provide a continuous learning approach in student learning. There are 95.56 % of students that would retake the course ("openlearning.com" 2014). This will improve lifelong learning skills. Students can be updated with the latest teaching video in MOOC. This will make students to always be competitive and achieve their learning goals after the course.

MOOC provides unique learning opportunities to many around the world (Liyanagunawardena 2013) and is currently perceived as a full-blown university course which is being offered for public enrolment (Tan 2013). The components of typical MOOC include video lectures along with online assignments, quizzes and examinations and its prominent feature is the high-quality interactive video lectures, such as Udacity (Tan 2013; Nawrot and Doucet 2014). The main goal of MOOC is to provide open access to self-learning via high quality of education which supports the process of learning and knowledge creation via social interactions and to advance study on learning (Nawrot and Doucet 2014).

However, from the recent research on MOOC, some challenges need to be overcame. Problems of maintaining student motivation and engagement for the course, lack of group tasks and live presentations and lack of human touch in the social

community are the shortcomings of MOOC that have been pointed out (Tan 2013). Planning, scheduling, prioritising, monitoring or evaluating in MOOC all takes time and patience and is challenging (Nawrot and Doucet 2014). Therefore, MOOC has to be integrated with LAMS and flipped classroom in the recent e-learning system to solve these shortcomings. Simple, affordable, customisable and easy-to-use features are really used to show how disruptive innovation can affect teaching and the future of learning. The application of MOOC makes students learn what they want with no boundaries of time, space, cost, age and background.

2.3 Flipped Classroom

The flipped classroom is a new pedagogical concept that replaces the standard lecture-in-class format with an opportunity to explore concepts and review materials from outside of the class (Azemi 2013), or a method, which employs asynchronous video lectures and practice problems such as homework and active group-based activities in the classroom (Bishop and Verleger 2013). The simplest form of a flipped classroom involves replacing traditional in-class lectures with video tutorials that students are expected to watch prior to class (Amresh et al. 2013; Bijlani et al. 2013). Students can browse via the learning materials at their own place and learning style anytime. However, actual classroom time can be used to engage students in discussion, projects, assignments, etc. (Bijlani et al. 2013). This means that students listen or watch the lecture at home but do homework in the classroom. Flipped classroom also represents the combination of learning theories once thought to be incompatible – active, problem-based learning activities derived from direct instruction methods founded upon behaviourist principles (Bishop and Verleger 2013).

Flipped classroom can be used to teach multimedia class since it is getting popular in secondary and postsecondary teaching institutions (Amresh et al. 2013) and evidenced to produce higher scores and engage students in discussion and problem solving (Azemi 2013). There are many courses, such as undergraduate engineering course (Bishop and Verleger 2013), electric circuit course (Azemi 2013), industrial engineering course (Toto and Nguyen 2009) and introductory programming course to engineering, engineering technology and software technology (Amresh et al. 2013), using flipped classroom in their teaching which can enhance student learning and is efficient to improve student score after evaluation. Engagement and active participation in the classroom teaching environment will motivate students and promote student learning. Flipped classroom can provide the students with a better learning environment, increase motivation, lessen stress during learning, assist them to understand the subject better and flex time for learning (Amiri et al. 2013). Students can learn better and have better interaction with the teacher.

3 Design Model for e-Learning System in Taylor's University

As mentioned above, we propose a design model for our e-learning system, which will integrate LAMS, MOOC and flipped classroom. To teach online entire course, we need to plan and design our class so that we can conduct our class online without any problems, such as student participation and networking problem. We will think: does any pedagogical elements apply when we conduct our class online without any face-to-face meeting between students and teacher? The teacher is just appointed as a facilitator and guides the teaching and learning process in the classroom. Is this effective in our e-learning system? Will students achieve all learning goals? Hence, we need to implement a good design model in our e-learning system with the advanced technology nowadays.

Our school, School of Computing and Information Technology (SOCIT), is using TIMeS for conducting e-learning. This system is more to learning management system and still needs to improve or upgrade to be more efficient and effective for student learning. MOOC has been launched in SOCIT, Taylor's University, to enable students to learn game development tools in order to promote our school courses. With the advantages of MOOC, we can increase student learning by increasing their motivation and engagement in computing studies. LAMS, with its advanced features of planning learning design and assessment and monitoring of learning activities, need to be integrated in our e-learning system (TIMeS). Flipped classroom is used to promote advanced learning that enables student self-learning and discusses later in face-to-face session to promote more effective learning in the classroom because students have explored the learning contents before they attend the class.

Figure 1 has illustrated the design model for our e-learning system, TIMeS. Basically, this model is applicable in SOCIT, Taylor's University, for all computing subjects. Traditionally, the face-to-face session was conducted typically, giving lectures in the classroom and homework outside of the class. Students just listen to the lectures in the face-to-face classroom session and some learning activities during lecture time may be carried out but it depends on the teacher's planning. Students feel bored and become passive in their learning process, especially for some computing theories, programming, facts and algorithms. The inverted situation will become better, which is called flipped classroom. Flipped classroom enables teachers to give lecture notes and teaching contents before the face-to-face classroom session. Students are encouraged to study by their own and watch the instructional video; lecture contents are given and done at home or outside of the class. Since MOOC provides us the opportunity to upload our instructional video, we use it and upload our instructional video and students can watch it before the face-to-face classroom session. MOOC enables students to access and revisit learning videos as much as they want and this provides the opportunity to students to be reflective and the flexibility to students to engage in learning activities. Students can integrate new learning into their prior learning with the reflective learning.

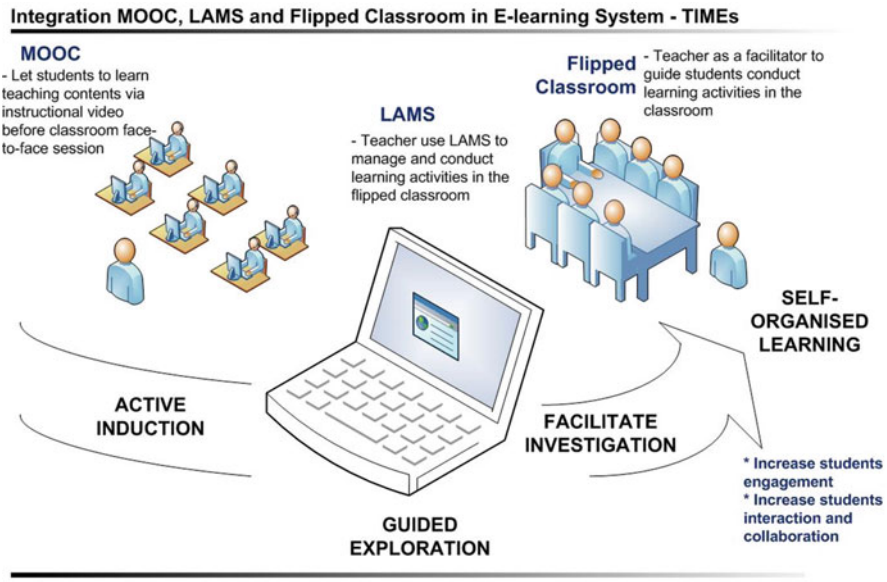

Fig. 1 The design model for integration MOOC, LAMS and flipped classroom in TIMeS

During face-to-face session, the teacher will conduct the discussion and learning activities in the classroom. This will engage students in the discussion and motivate them to share their ideas and learning in the classroom. Directly, active learning is adopted in this situation. LAMS is an e-learning system that enables the instructor to manage learning activities either in the classroom or out of the classroom, synchronous or asynchronous. To make face-to-face session more attractive, LAMS is a good platform to conduct learning activities in the classroom. Chatting, forum and discussion can be conducted via LAMS and follow the sequence of design. The teacher can monitor and track students' status for learning activities. Students feel enjoyed to learn when they are chatting, discussing and commenting in the forum. This learning environment is so engaging and promotes students to study by participating in activities actively. In active learning, the teacher can activate the induction and guide students to explore themselves to learning contents. The teacher also can facilitate further investigation for the learning and this will encourage students to move towards self-organised learning. They become more independent in their learning and the teacher acts as a facilitator in the classroom and guide or motivate students to study. The flexibility with improved pedagogy and learning theories and instant feedback is really helpful to promote student learning by increasing the social interactions among students via this model.

4 Conclusion

Beyond the situation we have made for the greater flexibility and accessibility of online learning, the online learning is becoming more expected and even demanded by students. Although teaching online presents many challenges to the teachers, there are still many benefits and advantages to be gained from the experience. Let us integrate LAMS, MOOC and flipped classroom to make our e-learning system to be more effective and efficient in future learning, self-organisation and active learning. The proposed design model can be utilised alternatively to implement more comprehensive and advanced e-learning system in our school system. With online learning, cross-cultural and international collaborations become possible, without more expenses and difficulties of time and space, which allow students from all over the world to share and exchange their ideas and works in concert on projects and topics of interest to both.

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Holistic Assessment: Creating Assessment with Students

Simon Williams and Lim Chong Hin

Abstract Assessment can be a complex area for both the student and teacher to understand and use in the classroom. This study investigated the possibility of creating assessments with the students to reduce the subjectivity of it. A classroom of lower intermediate students were involved in a project where they used a number of alternative assessment methods, as well as dually created assessment method with the teacher. The study takes an action research approach with observations from the teacher as one of the sources of data. The study found that both the teacher and student had different ideas on what should be assessed, prompting the teacher to adjust the assessment criteria to more closely align with the expectations of both the learner and assessor. The study then surmises that creating assessment with students may reduce subjectivity and increase understanding on the part of the learner on the assessment process. The paper finishes with suggestions and approaches on how assessment can be created with the assistance of learners.

Keywords Alternative assessment • Holistic learning • Project-based learning • Cocreated assessment

1 Literature Review

1.1 Holistic Learning

Holistic learning – though not defined as a method but a paradigm by Miller (1992) – aims to address education in terms of the student as a whole. In comparison to what is seen as 'traditional education' with a focus on meeting set standards and test taking, holistic learning promotes the student as an individual, with individual needs and goals (Forbes 2003). Therefore, a standardised testing model creates a quandary

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in holistic learning, as its very aim is to see education in a new light and to shed away the past factory-like conditions of the classroom. To move learning in a more holistic direction, alternative approaches are now being utilised such as project- and problem-based learning. And, to align with these approaches, alternative assessment methods are being used to gauge learning, such as portfolios, self-assessment (SA) and peer assessment (PA), with a greater focus placed on formative means than summative to assess learning outcomes.

1.2 Holistic Assessment

The literature on assessing holistic learning is limited which in part is due to the wide variety of holistic initiatives available. This, according to Forbes (2003), 'hampers broader research' (p. 3) and a deeper understanding as to what actually constitutes holistic learning. Nevertheless, researchers have attempted to assign attributes that can be considered holistic. Hare (2006) proposes a number of characteristics associated with a holistic learner – they include: high achiever, belief in own self-worth, compassion and loyalty (p. 308). This is just one interpretation of holistic outcomes; however, assessing these values may prove to be more difficult in a classroom setting.

To achieve a curriculum that moves away from a so-called traditional approach, project- and problem-based learning and a system that employs portfolios to track learning could be considered. To assess this kind of work, there are currently two methodologies available: formative and summative. Summative assessment – administered at the end of a semester in the form of a test or exam – usually assesses knowledge acquired over the length of that course. Conversely, formative assessment is a process and is usually not connected to a particular test. Instead, evidence of student learning is collected and used to create a wider picture of the student's learning (McManus 2008). This method can be seen as more holistic compared to a summative approach, as work is collected from various sources to help build a bigger picture of a student as a learner.

Two methods, in particular, which have shown promise by providing an alternative to standardised testing, are self- and peer assessment. Boud and Falchikov state that self-assessment is how learners make judgements on what they are learning in terms of success (1989). Peer assessment is a method by which peers can assess or provide feedback on peer's work. Assessing a holistic learning environment could very well start with these two approaches as they, by their very nature, are more inclusive whereby centralising the student in the assessment process instead of being a passive reciprocation of it. The next section will look at how formative assessment and more specifically SA and PA can be created holistically.

1.3 Creating Assessment Holistically

Assessment can be a contentious issue and some researchers have taken to pointing out various contradictions. Reynolds and Trehan (2010) questions the illusion of alternative methods of assessment. He says that even though SA and PA seem inclusive, the assessment itself is created by the teacher. Thornbury (2013), then, affirms that: '…it is the tester – not the test taking – who decides what counts as knowledge, and how you count knowledge'. Reynolds & Trehan and Thornbury highlight the notion that assessment, even assessment we deem to be more learner-friendly and holistic, is in essence flawed, as in some cases it continues to be dominated by the teacher and their view of what constitutes academic achievement.

To address the concerns, Heritage (2008) and McManus (2008) offer advice on the creation of formative assessments, including SA and PA, and introduce the notion of involvement. This refers to both learner and teacher being involved in the creation of assessment and agreeing upon learning outcomes. They state that this involvement creates transparency of the learning process, which allows the learners to keep track of their own progress. To develop the idea of involvement further, Stoynoff (2012) states that reliability with assessment can be increased when learners and teachers are trained in the design of it. This sentiment is also partially shared by Ross (2006) and Chang et al. (2013) who also suggest that reliability can be increased with training for both the learner and teacher, though they do not go as far as to say the learners should be involved in the design.

In sum, creating assessment with learner involvement may create a stronger partnership with the teacher, which in turn shifts the paradigm of the classroom from the learner and assessor to a mutual team with the same outcome. There is limited research on involvement and its actual application in the classroom. Therefore, a research needs to be conducted to investigate if learners and teachers actually agree on what should be assessed. Furthermore, to investigate the benefits of such involvement as it does involve extra work for both the teacher and learner, and finally to research possible practical ways in which this process can be carried out.

To investigate the items mentioned above, three research questions were created and they are:

- Do teachers and learners agree on what should be assessed?
- What are the benefits of creating assessment with learners?
- How can assessment be created with learners?

2 Methodology

An action research approach was taken for this study and adapted from a model by Kemmis and McTaggart (2005). In addition to this model, the work of Jean McNiff (2002) was also used as it provides practical tips for educational practitioners.

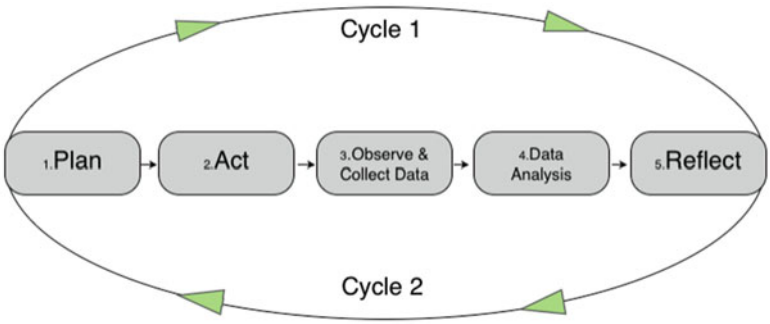

Fig. 1 Adapted Kemmis and McTaggart action research model

The original Kemmis and McTaggart model employed a three-step, two-cycle framework. However, the adapted model in Fig. 1 increases the steps to five in order to collect more data. The adapted model also employs a two-cycle system with the second cycle in place to introduce improvements and suggestions made after the first cycle. Action research can obtain data from a number of areas, though the two main points in this study were observation and reflection.

3 Data Collection and Analysis

Fox (1998) ascertains that observation is not a matter of passively watching but a method which engages the brain, eyes and ears, in order to understand what we are seeing. Erickson, then, states that observational fieldwork can be beneficial when there is a need to find out more about specific occurrences (1986). Dewalt and Dewalt (2011) claim that observation can be a way to increase validity by helping the research to understand the study in context.

Therefore, for this study, the researcher – also the teacher – made detailed notes in line with Erickson's (1986) recommendations for note taking during observations and recorded for later analysis and reflection.

The reflective aspect of action research is important as it provides the research with an avenue to critically reflect on practices in order to make improvements (McNiff 2002). The role of reflection in research and its validity has been researched and supported by a number of studies to date (Bretag 2004; Chamot et al. 1998). In this study, the researcher reflected on the collected data and observations after each completed cycle in order to make improvements for the following cycle and to create an overall picture of the research.

Aside from observations and reflections as a data point, McNiff (2002) recommends the creation of a 'critical friend'. The purpose of the friend is to act as a conduit for reflection. As the researcher discussed the research, the critical friend offered a different viewpoint that may help the researcher to reflect more critically on the research being carried out. In this research, the critical friend provided the

researcher with an additional point of reflection by providing insight and opinion on the study which helped the researcher to re-examine areas of the research.

The participants in the study attended a private university in Malaysia. The participants came from Korea, China, Vietnam and Malaysia and were attending a 6-week English preparatory course to gain English proficiency before beginning foundation and degree courses. There were eight students in total and their ages ranged from 18 to 24.

4 Data Analysis

This research sets out to answer three questions (below). In the next section, each question will be addressed and answered with data from observations, reflections and discussions with the critical friend:

1. Do teachers and learners agree on what should be assessed?
2. What are the benefits of creating assessment with learners?
3. How can assessment be created with learners?

4.1 Do Teachers and Learners Agree on What Should Be Assessed?

Cycle one of the action research contained a rubric that was created entirely by the teacher and without learner involvement. The rubric was written in English to suit the level of the learners and uploaded to a class website to be viewed by the learners. The learners were then given the outline of a simple project with the expected outcomes. Though the teacher thought the rubric was clear and concise, he was concerned that the level of student involvement was low. This concern was discussed with the 'critical friend' who echoed the sentiments of Heritage and McManus to involve the learners more heavily in the process.

Together the teacher and learner created a new rubric, and upon completion of the second cycle, the researcher compared the rubrics from cycle 1 to 2. Figure 2 shows the rubric that was created solely by the teacher. However, when it is compared to the rubric in Fig. 3, from the second cycle, the differences are apparent. In Fig. 2, the teacher was focused on traditional written proficiencies such as structure, grammar and punctuation. Conversely, in cycle 2 (Fig. 3), the students stated that the weightage should be equal for each skill and, more interestingly, that 'ideas' and 'page presentation' should be included. In terms of weightage, the students suggested that the original scores should be changed to even scores for each skill. The teacher had originally intended to weight the easier skills such as vocab and punctuation lower and to weight the more complex skills (structure, grammar, sentence structure) higher. The students, however, thought differently.

	Very Good	Good	Developing
Content 5	I have expanded and explained my topic by collecting lots of research from books and online. I didn't copy any any content from information that I found online, in books or from friends.	I sometimes expanded and explained my topic by collecting some research from books and online. I copied some content from information that I found online, in books or from friends.	I didn't expand or explain my idea so much, because I did very little research. I copied lots of content from information that I found online, in books or my friends.
Structure Main idea 6	My essay has a clear Introduction, main body sections and conclusion. Each paragraph has a clear main idea. Each main idea has supporting sentences	My essay doesn't have a clear introduction, main body or conclusion. Some paragraphs don't have a clear main idea. Some main ideas don't have supporting sentences.	My essay has only one big paragraph. The introduction, main body and conclusion are difficult to see. There are too many main ideas and not many supporting sentences. Let's work on planning your essay more.
Grammar & Sentence structure 6	The sentences are clear and easy to understand. Each sentence contains one idea. There are few grammatical mistakes.	Some of my sentences are unclear and a little difficult to understand. Some sentences contain more than one idea. There are some grammatical mistakes.	The sentences are often unclear and difficult to understand. The main idea is unclear. There are many grammatical problems, this means it is difficult to read and understand the essay.
Vocabulary & Punctuation 3	I didn't repeat the same words so much. I often put full stops, with capitals and commas in the right place.	I sometimes repeated the same words. I sometimes put full stops with capital letters and commas in the wrong places.	I used the same words often. I didn't put full stops or commas in the right place, or aren't used at all.

Fig. 2 Cycle 1 rubric – teacher created

	Very Good	Good	Developing
Content 3	The project have expanded and explained the design by collecting lots of research from books and online. We didn't copy any any content from information that I found online, in books or from friends.	The project sometimes expanded and explained the design by collecting some research from books and online. We copied some content from information that we found online, in books or from friends.	The project didn't expand or explain my idea so much, because I did very little research. I copied lots of content from information that I found online, in books or my friends.
Layout 3	My essay has a clear Introduction, main body sections and conclusion. Each paragraph has a clear main idea.	My essay doesn't have a clear introduction, main body or conclusion. Some paragraphs don't have a clear main idea.	My essay has only one big paragraph. The introduction, main body and conclusion are difficult to see. There are too many main ideas and not many supporting sentences.
Grammar & Sentence structure 3	The sentences are clear and easy to understand. Each sentence contains one idea. There are few grammatical mistakes.	Some of my sentences are unclear and a little difficult to understand. Some sentences contain many ideas. There are some grammatical mistakes.	The sentences are often unclear and difficult to understand. The main idea is unclear. There are many grammatical problems, this means it is difficult to read and understand the essay.
Ideas 3	There are lots of original ideas. You have Explained your ideas clearly.	There are some original ideas. Sometimes the ideas aren't explained.	The are few original ideas. The ideas aren't explained.
Wiki Page presentation 3	Images are relevant and are explained. The design is original and creative.	Images are sometimes relevant and explained. The design is sometimes original and creative.	Images aren't relevant and not explained. The design isn't very original or creative.

Fig. 3 Cycle 2 rubrics – teacher and student created

The class focused on projects as a method to teach writing. And to further engage students in the writing process, the teacher created web-based writing projects where the learners created web pages. In cycle 1, the teacher was more concerned with specific writing outcomes and mostly ignored creative aspects of the task, which, unbeknownst to him, seemed to have been important to the learners. Therefore, when the learners were asked to be involved in the assessment, they clearly stated that the creative aspect is an important area that should be taken into consideration for assessment.

4.2 What Are the Benefits of Creating Assessment with Students?

From question 1, the researcher established that in this study the teacher and learner differed on items or skills that should be assessed. Question 2, though, asks what the benefits are of doing this. Ross (2006) and Chang et al. (2013) both agree that with training the validity of SA and PA can be increased. The training suggested involves multiple attempts of the assessment in order for the learner to gain a deeper understanding of its use. So, by involving the learner in the actual creation of the SA or PA, this may further increase the learner's understanding of it as both the teacher and learner share the same objectives. Moreover, this approach to co-assessment creation also creates an environment of transparency where learners are more informed as to how they are being assessed and on what skills specifically (Heritage 2008; McManus 2008). Finally, involving our learners in the assessment process may create a more holistic classroom where there is a shared emphasis on learning. Instead of a classroom that is knowledge based and fixed with a summative test, more engaging learning environments can be created so that learning can take on a more holistic feel and, more importantly, learners can be assessed on criteria which they understand and are fully supportive of.

4.3 How Can Assessment Be Created with Learners?

On the completion of the action research, the researcher had used a number of systems to create assessment with the learners and had identified a number of common issues that arose. On the first attempt, the researcher noted that most – if not all – of students had no concept of assessment and how it was created. The teacher commented how surprised he was by the blank stares that were thrown back at him when he asked the students how they should be assessed on a task. This is an important point to consider, as if the learners do not know how assessment is created, how are they to know how it works or why it even exists? Very often the learners simply asked the teacher to decide, a response that the researcher often noted down.

Therefore, if involving learners in assessment creation seems like an unusual concept for the teacher, it will be equally or even more difficult for learners to become accustomed to. Hence, time and training was needed for both the learner and teacher to adapt to the new process.

As the assessment process was new to all the students in this study, the teacher first carried out some simple activities or projects and provided the learners with a simple self- or peer assessment, which were created by the teacher. By using the teacher-created SA or PA, the students became accustomed to SA and PA all the while familiarising them with the layout and items that can be assessed. The researcher also discovered that it is useful to have multiple SAs and PAs so that the learners see that various skills can be assessed. This essentially provides the learners with a benchmark of what an SA or PA is like and how it can be used.

The assessments were completed as a class and in small groups. In this study, the teacher used it as a task for the learners by asking them to produce a number of items that should be assessed on the next project. With this list, the teacher included the student-generated ideas in the rubrics. The teacher, of course, created the rubrics, due to the lack of experience that the learners process with rubric creation. Nevertheless, the items from the students were included, as well as items that the teacher felt were important. Then to continue the assessment collaboration, the teacher showed the students the rubric in the next lesson and asked them for feedback and comments. Finally, the weightage of each section was mutually agreed by the teacher and the learners.

5 Conclusion

This study investigated the involvement of students as co-assessors in their learning and found that for this study, there is a slight disagreement on the part of the teacher and learner in terms of what should be assessed and the weightage attached to each outcome. By using an action research model, the teacher/researcher was able to reflect on the assessment used in the classroom and significantly alter the way in which it was carried out by bringing the students into the process.

Though this study makes no claims to the wider educational community given the small classroom-based nature of it, the researcher can conclude that for this study, forming a partnership with the learners helped the class to form a shared view of what should be assessed and how. More research, however, into the actual outcomes of this approach will need to be conducted on a larger scale to discover if learner/student-created assessments process improves learning outcomes or achievement.

Encouraging learners to be involved in the creation of assessment could very well help to create a more holistic learning environment, although, to effectively involve the learners in the process of assessment creation, firstly the teacher must be prepared to accept the learners as partners in the assessment process. When this happens, holistic learning can really take place, as assessment is the main driver behind learning that decides the learning approach and desired outcomes of the class.

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Outcome Base Approach for a New Pharmacoinformatics Course for Bachelor of Pharmacy Programme

Long Chiau Ming, Yee Siew Mei, Ahmad Mazli Muhammad, Mumtaz Hussain, and Mohamed Mansor Manan

Abstract The pharmacoinformatics course (PHC500) aims to expose Malaysian UiTM undergraduate pharmacy students to the multidisciplinary field of pharmacoinformatics. The content of the course comprises of topics such as drug information and pharmacy information systems with practice relevant skills. This information is expected to be relevant to these graduates in their future responsibilities in the various fields of pharmacy. Aim: The current study will present a critical review of PHC500 by assessing the programme content and the teaching methods adopted. Its effectiveness is also measured by considering the feedback of students. Results and discussion: 89 out of 121 of the respondents thought that the course was well conducted and the course contents were interesting. Approximately 90 % of respondents also believed that the course content was relevant to their future needs as practising pharmacists. However, they would prefer a shorter duration and less labour-intensive assignment due to the fact that it is a one-credit-hour course. The course curriculum was reorganised in order to better reflect these course outcomes and student learning. The student feedback on the effectiveness and delivery of this course is very positive. Conclusion: The success of the programme will ensure students receive the technical skills and knowledge to allow them to confidently address pharmacy issues within this era of information. The current study showed the

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importance that the clinical curriculum for PHC500 be revised. The adopted approach to practice-based learning could potentially be used as a blueprint to allow a common focus for successful outcome-based education (OBE).

Keywords Curriculum assessment • Pharmacoinformatics • Drug information • Malaysia • Outcome-based education

1 Introduction

OBE is not a new theory but has been a major exercise for the medical course. Besides, it is also advocated by other healthcare professional courses such as pharmacy programme and nursing programme. The Korean Accreditation Board of Nursing Education supported the execution of this approach (Kim 2012). The School of Pharmacy at the Chinese University of Hong Kong has its own guideline of outcome-based teaching and learning (Kember 2005).

In this era of science and technology, the application of information technology has been used widely in various sectors. Health sectors are also one of the sectors which have integrated the application of information technology into its services. With the advent of health informatics, the role of pharmacy in health informatics is developing fast and generally the term 'pharmacoinformatics' is used to describe pharmacy information system and drug information (Ibrahim et al. 2002).

Despite of advanced technology system provided in the healthcare setting, its usefulness might be low if the pharmacists do not acquire the related knowledge and skills to use those information technologies. Hence, to avoid this problem, the pharmacy school can play their role in providing a better education to the future pharmacist so that the practice and application of pharmacoinformatics will be optimised (Ibrahim et al. 2002).

Meanwhile, the objective of a pharmacy education and learning is to offer the student with the core values and crucial expertise and abilities that she/he will certainly later apply to her/his method. The objective of competence-based education and learning is to make specific the hyperlinks between education and practice such that education and learning is customised to the demands of practice and not the interests of those which offer the education. As the importance of the task competence is assessed strongly on the end results of the job task, we would say that this approach aids to differentiate the demands of understanding and skills, which might be analysed via the examination process, and the suitable application of understanding and skills to generate the required end results, that is, the essence of the competent method.

After the implementation of OBE in UiTM curriculum, 11 outcomes (POs) have been outlined. The outcome content is imperative in churning high-quality students. Since the outcomes are absolute, there is no suggestion to be implemented. The POs include acquiring knowledge, techniques, multidisciplinary talents, value and ethics, professionalism and managerial, entrepreneurial and leadership skills. In agreement with that, the programme outcomes (POs) for the Bachelor of Pharmacy around prepare the pharmacist with the ability to provide patient care in cooperation with patients, prescribers and other members of an interprofessional healthcare

team based upon sound therapeutic principles and evidence-based data, taking into account relevant legal, ethical, social, cultural, economic and professional issues, emerging technologies and evolving biopharmacy, pharmaceutical, social/behavioural/administrative and clinical sciences that may impact therapeutic outcomes. The 2nd PO is the student's ability to manage and use resources of the healthcare system, in cooperation with patients, prescribers, other healthcare providers and administrative and supportive personnel, to promote health; to provide, assess and coordinate safe, accurate and time-sensitive medication distribution; and to improve therapeutic outcomes of medication use. Lastly, the 3rd PO is the student's ability to promote health improvement, wellness and disease prevention in cooperation with patients, communities, at-risk populations and other members of an interprofessional team of healthcare providers.

2 Method

2.1 Course Analysis and Improvement

For the past few years, pharmacy instructors and establishments around the world are checking out the areas and usefulness of OBE. When developing the course, eight key academic abilities are grouped into three extensive areas (Fig. 1). The capacities were created from specified keywords, literature searches and discourse among panels of professionals. The goal is that students will attain CO of their learning.

Furthermore, the curricular design procedure (Fig. 2) was also conducted.

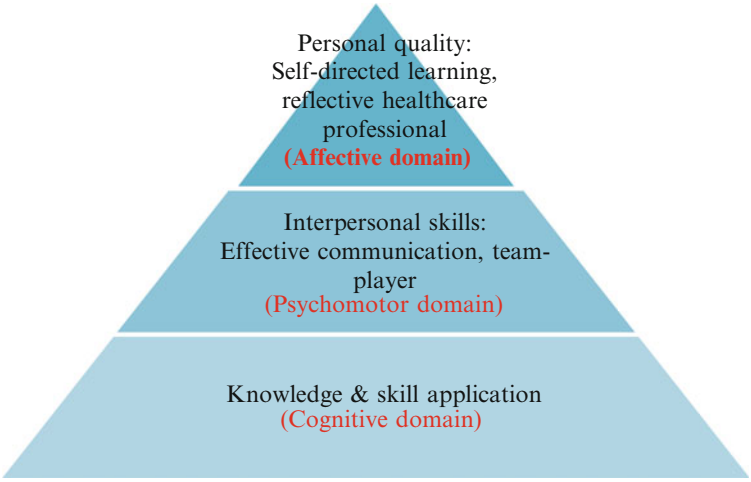

Fig. 1 The eight desired graduate capabilities of the UITM programme showing the development of personal attributes and generic capabilities forming the core of the curriculum. Modified from reference (Candy et al. 1994)

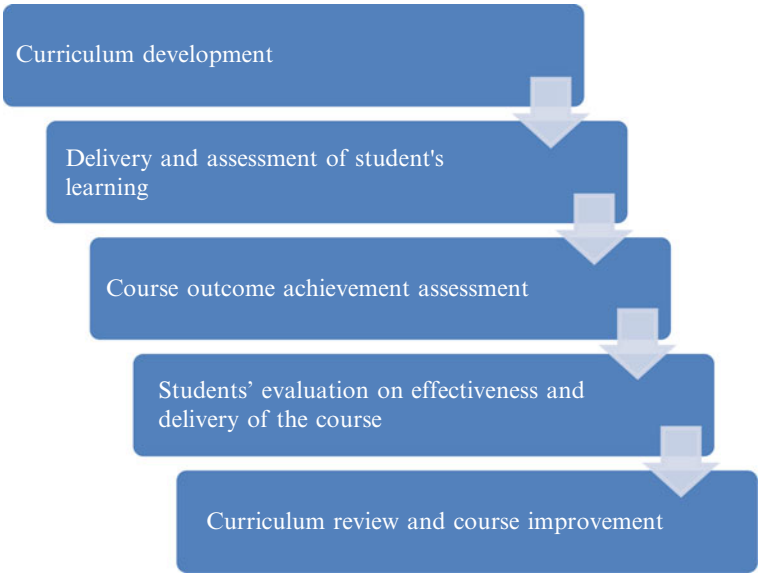

Fig. 2 The educational model of curricular design procedure

The Faculty of Pharmacy of UiTM reviews the curriculum every 4 years. The results serve well for OBE and "needs-based" curriculum to become a competent pharmacist (Hadi et al. 2011). The OBE curriculum design aims to provide an educational and academic programme that focuses on students' outcomes, meaning that students should be able to demonstrate the stipulated programme, course and learning outcomes that the academic staff/faculty had designed for the programme (Spady 1994).

According to the study plan, PHC580 is offered during semester 8 (4th year) with 1 credit hour (14 contact hours). This course exposes the student to the multidisciplinary area of pharmacoinformatics. The main focus is to improve their skills and role as a highly competent hospital clinician and drug information pharmacist. In the attempt to make this course to be effective, appropriate and suitable, topic selections should be studied so that the future pharmacist can gain a thorough knowledge on pharmacoinformatics. Pharmacy students should equip themselves with a sound knowledge on this area. This is to ensure that the seven roles of a future pharmacist described by World Health Organization (WHO) could be achieved. The seven roles stated include pharmacist roles as caregivers, managers, decision-makers, communicators, leaders, teachers and lifelong learners (Abrika et al. 2012).

In congruent with the PO, the course outcomes for this course PHC580 pharmacoinformatics are:

- CO 1: Describe current practice of pharmacoinformatics and pharmacy information system
- CO 2: Understand formulary management principles
- CO 3: Describe benefits of an effective formulary system

The delivery methods for this subject are lecture, tutorial and small group discussion. The ultimate objective for the lecturers is to achieve the entire COs. As the COs involve understanding and implementing the information, students were given many case studies and guidelines on the subjects. Most of the COs will need the student to understand the concept and memorise the definition of each process and method. Students are more excellent in questions involving understanding rather than definition.

In order to succeed the OBE, student assessment is as important as course planning and implementation. The OBE assessment stresses the importance of criterion referencing which is intended to judge student achievement. The student is considered to have achieved a certain level of competence if his achievement matches the criteria (Spady 1994).

The OBE assessment has to conform to few principles. Those principles include a valid, reliable and fair assessment. The assessment should be both comprehensive and explicit and be able to reflect the knowledge and skills that are important for students. Furthermore, the assessment should support every student's opportunity to learn things that are important and thus stretch the student to the limits of their understanding and ability to apply the knowledge (Killen 2000).

2.2 Students' Evaluation on Effectiveness and Delivery of the Course

Validated and pilot-tested questionnaires consisting seven questions were distributed to the students after their final test. Apart from basic demographic data, the questionnaire included questions on students' evaluation and opinions on the effectiveness and delivery of the covered based on five-point Likert scale. Furthermore, the students also were requested to provide suggestions to improve the course based on the strengths and weaknesses of the course and the additional ways the learning outcomes could be achieved and the data collected were analysed qualitatively (Ming et al. 2011).

3 Results and Discussion

3.1 Suggestion for Course Outcome

- CO 1: Able to describe current practice of pharmacoinformatics and pharmacy information system
  - Suggestion: Able to analyse the conceptual terms of pharmacoinformatics and pharmacy information system

- CO 2: Able to understand formulary management principles
  - Suggestion: Able to apply the principles of formulary management
- CO 3: Able to describe benefits of an effective formulary system
  - Suggestion: Able to compare the implementation of effective formulary system

Suggestion: All of the suggestions being proposed due to the terms used do not reflect Bloom's taxonomy and the level of psychomotor domain for degree students covers from P1 to P3.

3.2 Course Syllabus

Programmed, systematic and structured curriculum review is essential to ensure quality professional education. Curriculum evaluation is a part of the OBE exercise that enables the institution to validate the compliance of didactic and experiential strategies with the current needs and future demand of the profession. The four conceptions of curriculum as highlighted by Ewell, namely, designed curriculum, expectational curriculum, delivered curriculum and the experienced curriculum, must be evaluated for an effective curriculum review (Ewell and Jones 1996).

It is important to note that research done by Ibrahim et al. back in 2002 (Ibrahim et al. 2002) on the design and evaluation of the pharmacoinformatics course at a pharmacy school in Malaysia had suggested that this subject was divided into five segments that include the introduction of drug information services, web-based information and Internet, telemedicine, approaches in handling drug inquiries and also the application of a pharmacy information system (Ibrahim et al. 2002).

Meanwhile, we have expanded the curriculum scope so as to keep abreast with the latest IT and informatics development as well as the expanded roles of a pharmacist. One of the pharmacoinformatics subareas is on drug information services where the pharmacist is responsible in handling the drug information request. In this area, the pharmacist is required to acquire a sound knowledge on effective searching, interpreting and evaluating of drug information, as well as analysing adverse drug reaction reports and composing bulletins (Hadi and Long 2011). Secondly, under information technology and Internet scope, where pharmacy information systems such as electronic prescription, clinical decision support and computerised prescriber order entry are practised in a healthcare setting whereby computers and information is used in innovative ways to provide better healthcare services. The third area is on drug formulary management whereby the pharmacist imparts their role in the pharmacy and therapeutics committee in managing the drug formulary. Pharmacists routinely play an integral role in conducting periodic drug utilisation review for the purpose of ensuring an appropriate and cost-effective therapy. Defined

daily dose, ABC and vital, essential and nonessential analysis are the tools used to manage a formulary medicine list and identify medication use problems. In supply chain management, pharmacoinformatics involves the use of information systems to provide better pharmacy decision-making in planning and monitoring the availability, affordability and usage of drugs as well as in managing human resources (Zamaludin et al. 2015). In health policy, pharmacists are perceived to have well understanding on national health financing and to be familiar with telehealth and telemedicine. There are many emerging new areas of pharmacoinformatics that would potentially change the current health practices. It is crucial to ensure a well-trained pharmacy graduate in these areas to optimise the collaborative healthcare services.

3.3 Students' Evaluation on Effectiveness and Delivery of the Course

One hundred twenty-one students participated in the survey which gave a response rate of 75 % (total of 161 students in the 4th year cohort). Female respondents consist of 70 % of the sample which mainly attributed to the fact that almost 75 % of the pharmacy students in the faculty are female. Generally, the students thought that the course was well conducted and the course contents were not dull. Students' feedback also show that up to 91 % agreed that they had enhanced their knowledge of pharmacoinformatics after the course. Approximately 90 % of them also thought that the course contents were relevant their future practice as a pharmacist. This is important information considering that all the students had been trained in the tertiary care hospital, community pharmacy and manufacturing facility for a total duration of more than 7 months in their previous training. However, majority of the students felt that the assignment given was more advanced than their learning level. Many of the students gave their opinions from the open-ended questions about the strengths and weaknesses of the course. Many of them mentioned that assignment on performing a comprehensive drug review on unlabelled indication was too time consuming and required much critical appraisal of clinical data and literature (Hadi et al. 2010). Some of them also felt that the course contents could be streamlined so that there are no overlapping and repetition of several topics such as drug utilisation and drug formulary management as well as pharmacy and drug therapeutics committee. Owing to the fact that this is a one-credit-hour course, they are not comfortable with the written final examination and wide range of topics covered. They stated that pharmacy automation and robotic dispensing could be conducted as a site visit rather than a class in lecture hall. The details of the findings are presented in Table 1.

Table 1 Student evaluation of the course with five-point Likert scale

Statement	N (%)		
	Strongly agree to agree (5 and 4)	Neutral (3)	Disagree to strongly disagree (2 and 1)
Course is well conducted and interesting ($N=121$)	89 (74)	23 (19)	9 (7)
Knowledge about pharmacoinformatics increased after the course ($N=119$)	108 (91)	9 (8)	2 (2)
Course was relevant to pharmacy practice ($N=120$)	107 (89)	9 (8)	4 (3)
Assignment given was appropriate ($N=118$)	19 (16)	21 (18)	78 (66)

Likert scale: 1 = strongly disagree to 5 = strongly agree

3.4 A De-emphasis of Time-Based Training

Calls to change clinical curricula through the implementation of OBE have additionally evaluated considerably of contemporary clinical education and learning to be oriented towards the amount of time invested in a component of training (e.g. a turning) as opposed to the abilities in fact acquired. Elements of pharmacy student training, such as eligibility for specialisation credibility, additionally often concentrate on time spent on particular experiences. Contemporary education, they suggest, must shift its emphasis in favour of creating the student's capabilities. Learners might proceed much faster or slower than their peers in a provided curricular part. Theoretically, by accommodating these different rates of discovering and abilities accomplishment, a curriculum with flexible time periods might be a lot more reliable and appealing than a strictly time-based educational programme (Table 2) (Frank et al. 2010).

Suggestion: The course syllabus was compiled into fewer chapters (10 to 8). This is because some of the subjects in this course were omitted due to the irrelevancy to the current situation.

Assessment

The existing assessment:

Continuous assessment (60 %)

- Test 1 = 10 %
- Test 2 = 10 %
- Assignment 1, assignment 2 and assignment 3 = 40 %
- Final exam = 40 %

To optimise the learning, the assignment given to the students also involves the CO of the subject. Students will be assessed using the following revised assessment:

- Test = 10 %

Table 2 Course contents of pharmacoinformatics

Existing	Revision
Introduction to health informatives: telehealth and telemedicine project	Introduction to pharmacoinformatics
National health financing/healthcare restructuring	National health financing in Malaysia
Economic pharmaceutical management	Economic pharmaceutical management
E-prescribing/electronic medication orders and its management	E-prescribing and its management
Drug formulary management and national essential drug list	Drug formulary management and national essential drug list
Drug utilisation review/drug audit	Drug utilisation review
Defined daily dose/ABC analysis/VEN analysis	
Pharmacy automation: automated medication dosage, filling and packaging, coding of information and barcodes, medication distribution, management and inventory control	Pharmacy automation
Online applications (apps)/social media and Internet technologies to pharmacy and medicine	
Pharmacy and therapeutics committee: the role and function (case study)	Pharmacy and therapeutics committee and its role and function

Table 3 Keyword for assessment based in taxonomy matrix

C1	C2	C3	C4	C5	C6
Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Identify	Explain	Apply	Analyse	Combine	Solve
Label	Relate	Modify	Sort	Compose	Critique
Locate	Describe	Build	Categorise	Design	Criticise
Select	Match	Construct	Investigate	Generate	Assess
Name	Discuss	Solve	Compare	Plan	Conclude
State	Estimate	Sketch	Differentiate	Formulate	Justify
Write	Confirm	Produce	Examine	Revise	Judge

Presentation = 10 %
Problem-based education = 10 %

- Assignment = 20 %
- Final exam = 50 %

For this course, objective tests measure the learners' ability to remember facts and figures as well as their comprehension of course materials. Exams are used primarily for grading or selection purpose. While in case study assessment, students are given a factual description of a problem or situation. They are asked to analyse some information, diagnose the problem and prescribe a solution using keyword as presented in Table 3. Final grades will depend on the student who will demonstrate successful completion of the following outcomes as evidenced by successfully passing written tests and examinations or case studies.

Table 4 Pharmacoinformatics taxonomy matrix

Existing format	Suggestion format
20 questions (20 marks)	Remain
Covers knowledge (C1) and comprehension (C2)	
15 questions (15 marks)	10 questions (15 marks)
Covers knowledge (C1) and comprehension (C2)	Covers knowledge (C1) and comprehension (C2)
7 questions (35 marks)	5 questions (25 marks)
Covers knowledge (C1) and comprehension (C2)	Covers knowledge (C1), comprehension (C2) and application (C3)
2 out of 4 questions (30 marks)	2 out of 4 questions (40 marks)
Covers application (C3)	Covers application (C3) and analysis (C4)

Suggestion: The relevance of changing this assessment is to actively encourage the students to discuss and be involved in teamwork. Also, we want them to become more active learners who will be able to present their opinions and knowledge in class.

Taxonomy Matrix

The revision of taxonomy matrix is presented in Table 4.

Suggestion: The level of cognitive domain should cover from C1 to C4. For the psychomotor domain, we should cover from P1 to P5. Affective domain should remain.

Suggestion: The proposed format is presented in order to make it compatible and to ensure it is aligned with the course. Amendments made are in the aspect of mark allocation, number of questions, examination format and content of the syllabus.

The changes suggested above are mainly to ensure a strategic way to enhance the quality of teaching and learning. All the suggestions are based on the three-cycle model defined by Harden and colleagues (Harden 1999). The model classified the Dundee 12 outcome model into three dimensions which provides a framework for medical programme development. This model has been recommended by few preliminary studies (Kim 2012; Kember 2005) to be used in other healthcare professional programmes. The three dimensions of this model depict what the graduate is able to do, how the graduate approaches a given task and the development of the graduate's personal attributes.

3.5 Advantage of New Curriculum

The University of Dundee Medical School, one of the leading UK medical schools, who was ranked 5th in the Guardian 2013 University Guide, applied the OBE in 1997. This approach showed a promising result when their students showed the highest level of confidence of all UK medical students. The students mentioned that

their school education equipped them well for their first postgraduate year (Davis 2003). Aga Khan University Medical College in Pakistan is another university who adopted OBE and showed an encouraging result (Davis et al. 2007).

The taking into consideration of a competency-based method to teaching and learning of this subject using an OBE curriculum is critical. Some of the benefits are:

A new standard of skills: This is indicated by the graduated pharmacist's capability and improvement of their abilities.

A renewed dedication to outcomes: OBE curricula, with their emphasis on graduate capacities, could meet the university's mission to prepare pharmacy professionals to serve their people and communities.

A system to advertise a true continuum of pharmacy education: By determining expertises and turning points for each stage of pharmacy education and learning and technique, OBE could promote vertical and straight combination of training applications, from undergraduate pharmacy education to continuous professional development.

An approach to advertise learner-centred curricula: By giving encounters within a much more pliable period and focusing on the student's advancement, OBE could aid pharmacy student to be involved in a process that advances at their very own pace.

A method to de-emphasise time-based training in healthcare: Transitions from undergraduate education and learning to postgraduate education and learning to continuing expert development or upkeep of capability would certainly be based mainly on evidence of abilities rather than on currently widely used timeframes. Time then becomes a source for education and learning and not the standard yardstick for knowledge learned.

Potential for mobility of training: The adoption of a competency-based strategy could facilitate the activity of pharmacy student.

4 Conclusion

A revised clinical curriculum of which educational outcomes act as a blueprint for programme focus and achievement of common abilities needs to be established. It is important so as to ensure the students receive the best education possible and be well prepared to enter the profession upon graduation. It is also aimed to develop a more competent and well-rounded pharmacist.

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X-Space: A Way Forward? The Perception of Taylor's University Students on Collaborative Learning Spaces

Sheila Yvonne Jayasainan and Hardip Singh Rekhraj

Abstract Technology-enhanced learning spaces are a new trend at universities that are committed to delivering transformational teaching and learning pedagogies. Learning is becoming more social, informal, and less structured. Collaborative learning spaces enable students to harness collective intelligence by engaging in active dialogue and group work, which in turn empowers their peers to create, share, and make beneficial academic contributions that exceed the ordinary classroom experience. This study aims to gauge the perception of students on X-Space classrooms – the collaborative learning spaces at Taylor's University Lakeside Campus. Piaget's constructivism and the theory of motivation guided this research by suggesting the need for students to become stakeholders in their learning. A mixed method of surveys and depth interviews were deployed to examine the effectiveness of X-Space in enriching students' learning experience. The data were analyzed both quantitatively and qualitatively to yield rich and insightful findings. The results indicate that X-Space might be the way forward especially for the kinetic and visual learners. Appropriate recommendations are also provided to boost the effectiveness of collaborative learning spaces and to further encourage students' reception towards this novel classroom mode.

Keywords Collaborative learning • Learner-centered instruction • Technology-enhanced learning spaces • Interactive learning

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1 Introduction

1.1 Learning Is a Social Process

There is a constant debate on the most effective pedagogical technique to be used in higher levels of education. Some are for imposing knowledge on students, while others suggest that although structures are known within discipline, students are expected to make their own discoveries (Lasley and Ornstein 2000: 20). In higher education, there seems to be a move towards allowing students to be more directly involved in the teaching and learning process. This move is commonly facilitated by technology-enhanced learning spaces, which are a new trend at universities that are committed to delivering transformational teaching and learning pedagogies. Even within the formal classroom setting, educators can move away from the traditionally passive teaching methods and allow for more active engagements with the students. The underlying question is how to motivate students to become stakeholders in their own learning process? This is where a need for collaborative learning environment comes into picture.

Collaborative learning is when students work collectively towards a learning goal that is best realized through the contributions of their fellow peers. More and more programs of higher learning have identified teamwork and collaboration as essential skills set, and having a classroom space tailored for collaboration will enhance students' learning (PR Newswire 2013). Gokhale (1995: 22) defines collaborative learning as "an instructional method in which students at various performance levels work in small groups towards a common goal, and the students are responsible for one another's learning as well as their own." In addition, Bonwell and Eison view collaborative learning as a strategy "that involves students in doing things and thinking about the things they are doing" (1991: 2). These parallel definitions emphasize the active involvement of students in groups that facilitates the construction of their own learning.

Collaborative classrooms allow students' space and flexibility to work in groups within a predefined space. In their respective groups, students may switch between laptops to tablet PCs or handheld devices to view, share, and discuss matters pertinent to their lesson through a fairly large screen that is visible by all group members [e.g., a dedicated television/LCD screen]. To complement this group setup, the educator or facilitator of the discussion has an easy access to the controller that enables group visuals to be projected onto the common screen of the classroom for joint-group viewing and to encourage a deeper discourse.

> Learning is social and collaborative requires feedback and interaction among participants, often in breakout groups. (PR Newswire 2013)

These collaborative learning spaces enable students to harness collective intelligence by engaging in active dialogue and group work, which in turn empowers their peers to create, share, and make beneficial academic contributions that surpasses the

ordinary classroom experience. Collaborative classrooms exemplify how physical learning spaces are beginning to adapt to the needs of today's educational needs. This trend also suggests that learning is becoming more social, informal, and less structured.

1.2 Problem Statement

With the advent of new pedagogical techniques and complementary technologies, orthodox teaching methods – passive and instructional – are gradually fading. Today's digital world has led to huge developments in how academic courses at tertiary education institutions are delivered, as more and more educators are adopting new means to captivate minds, engage students, and enhance their teaching ability.

In the context of adapting to technology-based pedagogies, Mason and Rennie (2008) assert that educators are confronted by a serious tension between not wanting to experiment with students and wanting to exploit new and highly flexible ways of making education easier, less rigid, and ultimately more valuable to learners of all ages and all walks of life.

As a result, a new generation of educators and learners is emerging, which will soon phase out the didactic form of instruction, the teacher-centered approach, that is gradually being deemed ineffective in engaging students. Educators today are expected to be less of a repository of knowledge and dispenser of information and more of an active enabler of education, allowing students to become stakeholders in their own learning.

In a new 5-year mission, Taylor's University (TU) aptly recognizes the needs of this new generation of learners and has adopted six strategic thrusts to propel itself as a forerunner in the education sector. One of the six thrusts is to achieve transformational teaching and learning, with emphasis on two key areas: (i) ensuring a conducive and responsive learning environment action plans and (ii) embracing technology action plans (Han et al. 2014). Aligned with the strategic thrusts, X-Space was constructed – future smart classrooms that are currently fully operational. These X-Space classrooms are purposively designed and are flexible formal learning spaces capable of facilitating a diverse learning experience in a highly collaborative and engaging manner (E-Learning Academy 2012).

The technological features and ambience of these smart classrooms complement the learning outcomes and assessment aims of most modules that are offered at Taylor's University. The X-Space design not only allows students to experience the use of technology in their teaching and learning journey but also strives to promote student collaboration, problem-solving, creative thinking, interpersonal communication, and ICT competencies (Han et al. 2014). So, how does this transformational teaching and learning benefit Taylor's University students in terms of its effectiveness and in enhancing their learning experiences?

1.3 Research Questions and Significance of the Study

Empirical research on the effectiveness of collaborative learning at local universities is scarce. There are two studies that are remotely connected to this research – Musa et al. (2011) studied the implications of project-based learning and its impact on language acquisition at the workplace and Han et al. (2014) mainly focuses on the important design factors that make an effective collaborative classroom for teaching and learning. Hence, the absence of learners' feedback and views on the effectiveness of X-Space is a crucial factor that must be considered to fill the aforementioned gap.

The aims of this study are to investigate the extent to which Taylor's University students consider X-Space as an effective learning strategy in enhancing their understanding and to discover their learning experiences by working collaboratively.

The following three questions guided this study:

1. What is TU students' perception on the effectiveness of X-Space teaching–learning strategy?
2. What is the attitude of TU students towards working collaboratively with others?
3. What is TU students' perception on the impact/effectiveness of X-Space classroom on their learning experience?
4. What is TU students' perception on the benefits of X-Space teaching strategy?

1.4 Theoretical Framework

Two (2) theories guided this research. The first is Piaget's constructivism, which emphasized the need for the learner to be actively engaged in their own teaching–learning process. The second is the theory of motivation which suggested that it was not only the instructional style that influenced a students' academic performance but how much that individual wanted to succeed. Both theories suggest the need for students to become stakeholders in their learning.

1.4.1 Constructivism

The word "constructivism" applies both to learning theory and to epistemology – both to how people learn and to the nature of knowledge. It is important to note that constructivism is not a particular pedagogy. In fact, the term refers to the idea that learners construct knowledge for themselves – each learner individually (and socially) constructs meaning – as he or she learns (Hein 1991). This theory suggests that learners construct knowledge out of their experiences.

> Learning is an active process in which the learner uses sensory input and construct meaning out of the world. The crucial action of constructing meaning is mental: it happens in the mind. (Hein 1991)

Eggen et al. (2006) opine that constructivism is often associated with pedagogical approaches that promote active learning and facilitate students' lively role or learning by doing (aka discovery learning). They assert that the shift towards students' becoming more content is due to the belief that learners are naturally curious. A student-centered approach should be meaningful, and the most effective form includes activities of "discovery learning" [learning by doing] (Eggen et al. 2006).

In the context of this study, this theory impresses upon the need for students to be allowed to be actively involved in the learning process rather than being solely passive learners. To do this effectively, students must have hands-on experience where they are allowed and encouraged to critically explore their learning environment. This type of instruction allows for long-term retention of knowledge and not merely regurgitation of information.

1.4.2 Motivation

Woolfolk (2007) defines motivation at an internal state that arouses, directs, and maintains behavior. Motivation can either be intrinsic (internal stimuli) or extrinsic (external stimuli). It might be necessary to provide students with incentives for accomplishing tasks, but ideally educators should attempt to nurture students to be intrinsically motivated. Motivation is a key component in learning. Not only does motivation help learning, but it is also essential for learning to take place (Hein 1991).

A major factor that influences students' academic performance is the belief that they can achieve what they set their minds to. Eggen et al. (2006) note that educators facilitate the internationalization process, and they do so effectively by designing learning activities that promote a positive, academic, and cognitive self-concept.

Within the context of this study, the variation in an instructional strategy from a more didactic instruction (teacher-centered approach) to one which is more collaborative learning (student-centered approach) may not in itself result in an increase in academic performance. It is noted that a students' academic performance might not be linked to the method of instruction but to how the student perceives his/her own learning abilities and takes charge to be intrinsically motivated to achieve.

2 Literature Review

2.1 Benefits of Collaborative Learning

Much has been written about the benefits of collaborative learning in terms of its impact on students' interpersonal skills and academic achievement. Many research studies suggest that students learn better when they work interactively with others, and the retention of information is improved through collaborative learning.

Collaborative teams do better in activities that require higher-order thinking and retain information longer than those students who work individually (Johnson and Johnson, cited in Ayon 2013a: 64).

In this approach to learning, students can acquire other skills and knowledge from each other. "The shared learning gives students an opportunity to engage in discussion, take responsibility for their own learning, and thus become critical thinkers" (Gokhale 1995: 22). Gokhale further suggests that critical thinking, one of the vital skills in academic life, can be gained through the collaborative learning interaction via the active exchange of ideas (1995). Kreijns et al. (2003) concurred with Gokhale that collaborative learning leads to critical thinking and also suggested that it can help to achieve a deeper level of learning and a better understanding of the taught lessons.

Collaborative learning can also promote higher-level thinking order. Ingelton et al. (2000: 6) highlight the "improvement in higher-order learning skills through peer collaborations" and list the following skills: discussing, negotiating, interpreting, organizing, applying learning in new situations, clarifying, discarding, redoing, and problem-solving as vital in student-centered learning. When students are in a group, they are more likely to take learning risks and to try new ways of doing and learning, than when they are working individually. Students working collaboratively can cover more ground and get more done than an individual student by sharing references, resources, and ideas (Ingelton et al. 2000).

Not only does collaborative learning impact students' learning but it can also improve their classroom interaction, social and interpersonal skills. Students learn to be both dependent and independent with the encouragement of sharing of ideas, roles, and resources. Students' confidence is fostered by projects or tasks "led" by them rather than the educator. Their anxiety about speaking or performing in public is likely to be reduced because of the sustained long-term interaction with others (Ingelton et al. 2000). This is especially vital for students whose second language is English.

According to proponents of collaborative learning, the fact that students are actively exchanging, debating, and negotiating ideas within their groups increases students' interest in learning (Dooly 2008). Most importantly, by engaging in discussion and taking responsibility for their learning, students are no longer passive in receiving information. Active learning is defined as any instructional method of learning and teaching strategy that ensures the involvement of students in the learning process (Simon, cited in Basheri 2010). Through this process of learning, students are provided the opportunity to further their own learning by utilizing their mental faculties while learning in the classroom. The role of the educator is merely to provide an active creation of knowledge in which students play an effective role of building their own knowledge (Basheri 2010). Thus, active learning focuses on the mental process of the students and how they implement their own learning. Many believe that active learning stresses on learning through repetition.

2.2 *Attitudes of Students Towards Collaborative Learning*

Students' attitude towards collaborative learning is very critical to the success of the learning process. There have been numerous predictions that students who grow up in the digital age will learn differently and demand a more engaging form of education. One such study by Oblinger and Oblinger (2005: 24) on the "Millennials" or those born from 1982 found that students today gravitate towards group activity and excel academically when learning from pictures, sound, and video, as compared to text. Millennials crave interactivity and have the natural ability to parallel process, and they thrive academically when learning collaboratively.

Additionally, as indicated in the framework, students' success in their academic performance is influenced by motivation, by how much that individual wants to succeed. Ku et al. examined the attitudes of 197 graduate students over 3 years towards online collaborative learning and found that students "favored working collaboratively in online environment" (2013: 928). The majority of these participants believed that collaborative learning environment resulted in a better learning. The researchers found three factors that contributed positively to the students' satisfaction with collaborative learning – team dynamics, team acquaintance, and instructor's support (Ku et al. 2013).

Similarly, Bartle cited in Ayon (2013b) who investigated the attitudes of university-level science students towards group activities and their impact on the students' personal and educational development found that their participants have very positive attitudes towards collaborative learning activities. In addition, participants reveal the importance of developing strong interpersonal skills as they felt that group activities help them develop these skills set (Ayon 2013b).

Choi and Ro (2012) investigated factors that impact the attitudes of the university's hospitality management students towards group projects. Their findings revealed that the students' perception of the project's appropriateness, instructor's support, and fair evaluation led to students' positive attitudes towards group projects (Choi and Ro 2012: 307). The importance of this study lies in highlighting the instructor's role in helping students experience successful group projects hence developing positive attitudes towards such projects.

A successful transition to university is crucial to students' motivation and retention. Research suggests that students engaged in collaborative learning activities are less likely to withdraw as a result of feeling isolated or not feeling wanted. Collaborative learning activities can meet some of the emotional needs of students – needs that are often overlooked in crowded lecture theaters and competitive learning situations (Ingelton et al. 2000). Ingelton et al. (2000: 8) further suggest that collaborative learning groups have the potential to provide students with a natural support system in an environment that they may find overwhelming, uncaring, lovely, or alienating.

2.3 Importance of Collaborative Learning in Preparing Students for the Workplace

Most universities strive to produce graduates who are competent team members, as employers' value people who can work in teams. It is important for graduates to be able to demonstrate to employers that they are team spirited and objective. Collaborative work is part of the daily operation of many organizations, along with collaborative monitoring (Ingelton et al. 2000). Employers look for graduates who are able to motivate themselves and make continuous assessments of their own contributions to a project, as well as those of other team members.

Musa et al. (2011: 194) surveyed 29 randomly selected second-year university students and concluded that project-based learning [which is based on collaborative learning] helped "facilitate the transference and inculcation of workplace-related skills among the participants…such as teamwork, managing conflict, decision-making and communication skills." Besides these skills, they further suggest that participants have become "more independent, confident, and productive in generating and discussing ideas" (Musa et al. 2011: 194).

Besides, Ingelton et al. (2000: 9) state that collaborative learning prepares "students in any discipline for the world of work." They provide a list of skills that are fostered by collaborative learning and that are valued by employers.

Their list includes the following (2000: 10):

- Cognitive skills such as the ability to analyze, evaluate, and synthesize information
- Critical thinking and problem-solving skills
- Numeracy, literacy, and visual communication skills
- Skills in interpersonal understanding with the capacity to communicate effectively and work independently and cooperatively
- A commitment to continuous learning

In essence, collaborative learning can play an essential role in improving students' learning and in preparing graduates to meet the expectations of employers in the workplace.

3 Research Methodology

The study was undertaken using a mixed method of both quantitative and qualitative methods. It consists of a self-completion questionnaire for students and semi-structured depth interviews for students and lecturers.

3.1 Research Design

This was mainly a descriptive study that was conducted to gauge the view of students towards the effectiveness of the newly adopted X-Space classrooms [collaborative learning strategy] at Taylor's University. To ensure accuracy of results, this study was undertaken with a mixed methodology.

The questionnaire technique is a very effective quantitative method that enables large-scale numerical data to be obtained over a short period of time. In this particular study, the researchers wanted to gain numerical data to determine students' views on the effectiveness of X-Space classrooms at Taylor's University and to get a wider picture of the situation across participants by identifying different phenomena among them. The researchers also wanted to explore these phenomena in more depth by using a qualitative technique. This was obtained by semi-structured depth interviews with three selected students and two lecturers whom are currently using these smart learning spaces at Taylor's University. The use of depth interviews is a useful strategy since it enables respondents to give as much detail as possible about their views on the effectiveness of X-Space classroom as a learning strategy, to express their opinions of the impact it has on their learning experiences, and to assess their attitude and behavior towards working collaboratively.

3.2 Participants

Fifty-five participants [50 for survey method and 5 for depth interviews] who were promised confidentiality, anonymity, and non-traceability were purposively sampled from those who are currently using these newly adopted X-Space classrooms at Taylor's University. Results obtained with purposive samples are not generalizable, and the sample is not representative of the population under study; however, it may provide very specific and valuable insights into the research questions under examination (Weerakkody 2009). Participants selected for the survey were of both gender: 15 males (30 %) and 35 females (70 %), and they completed a face-to-face self-completion questionnaire. This type of technique was selected as it has a high response rate (80–85 %) and is useful because it reduces "missing data" in which the respondents leave questions blank or choose the "don't know" response when they do not understand the question (Weerakkody 2009).

The participants selected were also of different programs/majors allowing for a more diverse view on the subject matter from across Taylor's University. Participants selected were 20 business students (40 %), 10 sciences and engineering students (20 %), 10 communication students (20 %), 8 design students (16 %), and 2 education students (4 %).

Weerakkody posits that in a multicultural society, every opinion counts, and the viewpoint of "others" may provide additional insights, points of views, and unusual opinions that can enrich a study (2009: 175). Therefore, in being inclusive of "others," 12 % (6 participants) were represented by international students, and 88 % (44 participants) were represented by local, Malaysian students.

3.3 Data Collection Methods

The use of mixed method for data collection, both quantitative and qualitative, can improve the validity (confirmability) of this research study especially since there is a diversity in the selection of participants.

3.3.1 Self-Completion Questionnaire

This face-to-face self-completion questionnaire consisted of ten items using the Likert scale format with a few open-ended questions. These items were derived from research questions that guided this study. The questions were clear, simple, and specific enough to be understood by the participants.

3.3.2 Semi-structured Depth Interviews

To get a deeper insight on the extent of the effectiveness of X-Space as a learning strategy and to determine its impact on students' learning experiences, the researchers conducted five semi-structured depth interviews with three students and two lecturers whom are currently using these smart learning spaces at Taylor's University.

3.4 Data Analysis Methods

The data were analyzed both qualitatively and quantitatively. The results of the questionnaire are presented both quantitatively and qualitatively, while the results from the interviews are presented qualitatively. The researcher used thematic analysis for qualitative data. When searching for themes, the researcher looked for repetitions of topics/issues, similarities, and differences between the ways that the participants might have discussed certain issues. The researchers analyzed the quantitative data by looking at the frequencies and percentages of each item on the questionnaire.

4 Findings and Discussion

The findings are presented in terms of themes derived from the analyzed data.

Table 1 TU students' perception of the effectiveness of X-Space classrooms

	Strongly agree	Agree	No opinion	Disagree	Strongly disagree	Total
X-Space makes learning easier (%)	24	58	14	0	4	100
X-Space enhances Creativity and expression of ideas freely (%)	34	48	18	0	0	100
X-Space enhances better understanding and more knowledge gain (%)	14	54	26	4	2	100

4.1 Effectiveness of X-Space

Based on the data collected from the questionnaire and semi-structured depth interviews, students have a very positive attitude towards the use of X-Space classrooms (collaborative learning) at Taylor's University (TU) (Table 1).

When students were asked to compare the effectiveness of the X-Space classrooms (learner-centered instruction) to didactic form of instruction (teacher-centered instruction), more than 82 % or 41 students strongly agreed that X-Space classrooms make learning an easier process. Only 2 students or 4 % strongly disagreed, and 7 students or 14 % had no opinion of this statement. The practical design of the classroom, which includes hexagonal shaped tables, movable chairs, and wall-mounted TV display, ensures a certain level of ease and comfort for students to participate in any collaborative activities (Han et al. 2014). Seating arrangements proved to be crucial in students' learning and participation in the classroom as interview data revealed that students "can share their work easily and can discuss with each other," and the design of the classroom allows for "freedom to move about and discuss."

The results also showed that more than 82 % or 41 students strongly agreed that X-Space classrooms enhance their creativity and enable them to express their views freely in class. Only 18 % did not have an opinion of this statement. Chanchalor and Chomphutong (2004) in their study found that more hands-on activities such as problem-based learning actually increased students' participation and encouraged creativity. Data obtained from the interviews also indicated that students "felt at ease when communicating with their group mates," and it "enables each group to present their images, discussion points, and arguments for everyone to see." In examining the responses of participants, there is a significant level of agreement among Taylor's University students regarding the creativity enhancement through the use of X-Space classrooms (collaborative learning). Lecturers who were interviewed also concurred that class participation has increased as "students are more enthusiastic" by the use of this learner-centered instruction.

Sixty-eight percent or 34 students strongly agreed that X-Space classrooms enhance better understanding of the lessons taught, and students gain more knowledge

in these smart learning spaces. 26 % or 13 students had no opinion of this statement. Only 6 % or 3 students strongly disagreed with this statement. According to Jolliffe (2007), collaborative learning requires students to work together in small groups to support each other to improve their own learning and that of others. This reflects the views that students gain more knowledge and better understanding, as interview data states that it "cultivates a culture where everyone has a chance to present their ideas so improvements/corrections can be made even if students are unsure." Students will therefore work together to achieve a common goal, and this should in turn result in positive outcomes such as an improvement in students' academic performance. Students felt a sense of accomplishment when tasks are shared rather than performed independently.

The lecturers interviewed felt that the use of X-Space classrooms are a "good learning strategy" and allows "interactivity" among students whereby "tasks can be set during tutorials," and the students can "work in groups to gather knowledge and present their views" for "other students to see." However, they felt that these X-Space classrooms should be utilized for more "mature students" – those undergoing their degree program rather than entry-level program like Foundation Studies. Interview data obtained adds that students undergoing degree-level programs will "benefit more," and there's likely to be "more lively discussions" as compared to students in their Foundation Studies. At times, group activities using X-Space classrooms "doesn't take off effectively" because students are more dependent on the instructor, and they "need a lot more input" from the instructor. It may be a "different experience for degree program students" as they tend to be more independent learners. They are "matured enough to discuss properly," have more "discipline in their own studies," and are more likely to "pay attention" during group activities.

The lecturers interviewed also strongly believe that there is "always benefit in traditional learning style" [didactic – instructor-centered instruction]. They further added that students "must have the foundation" in traditional instruction or didactic learning "before they can move into more collaborative learning." Data obtained from lecturers' interviews also clearly state that they accepted the usage of X-Space classrooms [collaborative learning] at Taylor's University as being "a way forward in terms of teaching–learning"; however, "it will definitely be of better value as students grow more advanced" with the use of technology in the classroom.

4.2 Attitude Towards Working Collaboratively

An examination of Table 2 reveals that 48 % or 24 students strongly agreed that they willingly participated in group activities, 40 % (20 students) agreed, 10 % (5 students) had no opinion, and 2 % or 1 student strongly disagreed with this statement. Data obtained from interviews state that students felt that an "X-Space learning is an improvement," it is "easier to find information from the Internet and incorporate it into group activities," and the use of X-Space classrooms "makes it easier to discuss with group mates." As posited in the theory of constructivism, learners construct knowledge for themselves (Hein 1991). This underlines the true essence

Table 2 TU students' attitude towards working collaboratively

	Frequency	Percentage	Cumulative percentage
Strongly agree	24	48	48
Agree	20	40	88
No opinion	5	10	98
Disagree	0	0	
Strongly disagree	1	2	100

of collaborative learning, in which students would take greater responsibility for their own learning, making them stakeholders of their learning progress.

Additionally, Relan and Gillani (1997:44) reaffirm that the resources of the web, the interactions with other learners, the guidance of the teacher, and the experiences resulting from collaborative activities all combine to effectively distribute the inputs of the course so that the onus shifts to the individual students to construct their own understanding of the topic.

Students enjoy the interactivity presented in working collaboratively using X-Space classrooms as they "don't feel so bored learning because there's often an interaction with group mates" compared with the didactic form of instruction in which they feel that it "is more like spoon-feeding," whereby the educator would "just teach and you merely listen." Besides, students also felt comfortable in working collaboratively as they "don't mind sharing their work" with group mates. Students mentioned that X-Space helped the social skills of their "shy friend who never voice out her opinion in class," but "during the X-Space classroom activity, she actually spoke up her views to us." This "learning environment really helped her to overcome her shyness and improve her social skills."

Students are also more "drawn to each other," and "helping each other" comes naturally during activities. Jolliffe (2007) states that students who work in small groups for a sustained period of time are able to improve their own learning and that of others. Therefore, students essentially learn how to be effective group members by learning how to manage conflicts, while at the same time, learn how to interact with various personalities. This is a useful skill in the workplace environment as Ingelton et al. (2000: 9) assert that skills in interpersonal communication, as well as team-spirited employees, are highly valued by employers.

> Students learnt better when working together rather in isolation; there is also an improvement in their social skills since it forces them to practice team and small group communication skills. (Mourtos 1997)

4.3 Impact of X-Space on Students' Learning Experiences

When students were asked their perception on the impact of X-Space classrooms on their learning experiences, 16 % (8 students) and 58 % (29 students) strongly agree, respectively, that X-Space makes learning easily adaptable for them. 18 % (9 students)

had no opinion of this statement. And 8 % (4 students) disagreed that X-Space makes learning easily adaptable. Interview data revealed that some students found that "it didn't take long to adapt" the use of X-Space classrooms. Students also stated that they were "surprised by the physical design of the room," but "after a few classes, they were used to it." They felt that it "wasn't hard" to adapt to the use of this new learning environment as the "transition was seamless" for them.

On the other hand, some students revealed that the use of this collaborative learning spaces was a "cultural and technical shock," and it "took them a month to adapt" to it. They felt that it was "a struggle for almost a month," and it "was very slow" for them to "present their content effectively" because they are used to the traditional learning method [didactic – instructor-centered instruction]. The technical aspects of the X-Space classroom also posed a difficulty for some students at first instance as they had "difficulty to present points effectively to the screen" and had trouble learning "how to connect the TV display." It is important to understand that students come to the classrooms with varying degrees of interpersonal, technical, and academic skills. The use of collaborative learning may make introverted students apprehensive because it requires them to communicate verbally, whereby they cannot remain passive or disengaged. It may also cause isolation to some if they are slow to adapt and understand the "know-hows" of using these smart learning spaces.

An examination on Table 3 also revealed that 48 % or 24 students strongly agreed that X-Space promotes more interactive group discussions, 40 % (20 students) agreed, 10 % (5 students) had no opinion, and 2 % or 1 student strongly disagreed with this statement. Based on interview data, all respondents agreed that X-Space creates an "interactive learning environment" for them. Students sensed working closely together, brought "people together," and instill "closeness" with group mates. This is in line with Roger and Johnson's (1994) concept of "promotive" interaction – defined as individuals encouraging and facilitating each other's efforts to achieve, complete tasks, and produce in order to reach the group's goals.

> In an industrial organization, it's the group effort that counts. There's really no room for stars in an industrial organization. You need talented people, but they can't do it alone. They have to have help. (John F. Donnelly, President, Donnelly Mirrors).

Table 3 also illustrates that 48 % (24 students) strongly agreed and 46 % (23 students) agreed that X-Space instills a more enjoyable learning environment for them. 4 % (2 students) had no opinion, while 2 % (1 student) strongly disagree with this statement. All respondents interviewed agreed that X-Space layout is not only "fun and beneficial," but it also enables students to "share their work with their peers." The use of X-Space classrooms is "a way forward" in teaching and learning pedagogy as it "cultivates a culture where everyone had to do their fair share" of the work. Roger and Johnson (1994) state that the purpose of collaborative learning groups is to make each member a stronger individual in his or her own right. They further add that individual accountability is the key to ensuring that all group members are, in fact, strengthened by learning cooperatively (1994: 4).

The results further illustrate that 24 % (12 students) strongly agreed and 54 % (27 students) agreed that X-Space enhances better focus in learning. 12 % (6 students) had no opinion, 8 % (4 students) disagreed, and 2 % (1 student) strongly agreed with

Table 3 TU students' perception of the impact of X-Space classrooms on their learning experiences

	Strongly agree	Agree	No opinion	Disagree	Strongly disagree	Total
X-Space makes learning easily adaptable (%)	16	58	18	8	0	100
X-Space promotes more interactive group discussions (%)	48	40	10	0	2	100
X-Space instills a more enjoyable learning environment (%)	48	46	4	0	2	100
X-Space enhances better focus in learning (%)	24	54	12	8	2	100

Table 4 TU students' perception on the benefits of X-Space

	Frequency (students were allowed to give more than 1 response)
Interactivity	36
Technology-savvy	31
Social skills	26
Unique learning experience	25
Innovative	21
Bonding	11

this statement. Interview data obtained states that students felt that this learning spaces helped them "focus better" as there are "given tasks to work on," and every member is "responsible for final outcome"; a clear "goal is in sight." On the other hand, some students felt that X-Space classrooms "easily distract people." Every student has "their own laptop," and it is "easy to just not pay attention and lose focus," while group activities are ongoing (Table 4).

4.4 Benefits of X-Space on Students' Learning Experiences

Based on the analysis of the open-ended questions in the questionnaire, students were asked about their perception on the potential benefits of using the X-Space classroom as a learning strategy at Taylor's University. The following themes were derived from their responses: students listed "interactivity" (36 students) as the most important benefit followed by being "technology-savvy" (31 students), having commendable "social skills" (26 students), having a "unique learning experience" (25 students), being "innovative" in the classroom (21 students), and having a "bonding" experience with group mates (11 students). This suggests that the majority of students may have positively benefitted from the use of collaborative learning activities practiced at Taylor's University.

Students also asserted that the use of X-Space classrooms at Taylor's facilitates development of the right job-related skills, namely, working in teams, being flexible, having the ability to interact with diverse groups of individuals, being technology-savvy, and having social and problem-solving skills.

Besides, data obtained from the interviews with lecturers suggest that the most significant benefit of the use of X-Space classrooms is not only the "increase in student participation" within the classroom but also the overall teaching–learning environment has become "more dynamic."

5 Conclusion and Recommendation

The majority of respondents have a positive attitude towards the effectiveness of using collaborative classrooms (X-Space) at Taylor's University. However, the past negative experiences with group work, absence or lack of instructions, and support from the instructors/lecturers contribute to some students' unfavorable disposition towards the use of collaborative learning. In other words, students perceive collaborative learning as helpful as long as their group members are accountable and dependable to complete their learning tasks. Slavin (1988) attests to this by stating that individual accountability and positive interdependence among group members were rife in collaborative learning and as long as the instructors/lecturers maintain good monitoring of the group progress.

Collaborative learning shifts the responsibility for learning to the students as they assume the role of "researcher" and "self-directed" learners. To maximize the potential and benefits of collaborative learning, the instructor must fully understand their students' preferred learning styles and their own conception of learning. This can help the instructors/lecturers to decide where and how to start their collaborative activities that will benefit most students. The result of the study indicates that the use of X-Space classrooms at Taylor's University might be the way forward especially for students who are kinetic and visual learners by enhancing their understanding towards a certain subject.

If we are truly interested in preparing students to be responsible citizens in an increasingly technologically advanced society, then our way of teaching students must reflect this. The projects and activities that instructors/lecturers ask students to take part in should reflect the current and future needs of these learners. Meaningful content in group activities is critical for the success of all students. For students to succeed within their groups, careful consideration regarding group heterogeneity must be given in conjunction with roles that ensure active, equal participation by all students. Creative assessment practices must be developed to document achievement of outcomes for students. All of these considerations require planning and structure in order for the teaching to be successful in X-Space classrooms at Taylor's University.

Wenger (1998: 22) elucidates the importance of modules/courses being designed with collaborative learning principles: "Learning [itself] cannot be designed: it can only be designed for – that is, facilitated or frustrated." The essence of collaborative

learning course design is on the application of activities appropriate to the subject and level of the students. As such, instructors/lecturers should be given ample training to help them in their preparation of these collaborative activities and projects to fully capitalize on engaging students. Merely being taught the technical aspects of X-Space classrooms are inadequate for the success of collaborative learning to take place at Taylor's University.

Students' attitude towards collaborative learning is very critical to the success of this learning approach. Results indicate that students perceive the use of X-Space classrooms as having a positive impact on their learning experiences. However, the researchers found that students would like the inclusion of instructors'/lecturers' support and guidance throughout the learning that is taking place. Students believe that X-Space classrooms are a way forward for TU; however, they are not ready to do away with the role of instructors/lecturers. The study reflects that there is still a need for some didactic form of learning to be used as complimentary to collaborative learning.

The importance of this study lies in highlighting the significant role the instructors'/lecturers' play in helping students' experience successful group activities and projects, hence developing positive attitudes towards the use of X-Space classrooms at TU.

Results suggest that X-Space classrooms as an effective learning strategy can eventually become a cornerstone of Taylor's University, a veritable pioneering selling point to encourage countless students to enroll at the university.

6 Future Research

Future research is recommended to get more insights about students' attitudes towards X-Space classrooms and the impact of this strategy on their learning as well as on their acquisition of job-related skills. It would also be interesting to investigate gender factors, program major, and/or status on students' attitudes towards collaborative learning, their perceptions of learning, and their preparation towards the workplace environment. Further insights could also be derived from the use of another method – an experiment of students in their X-Space classroom environment.

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Practical Tips to Facilitate CO:PO Mapping and Documentation

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Abstract Constructive alignment is an approach commonly used to align teaching and learning activities to the stipulated course outcome(s) (COs). Nevertheless, many lecturers find it a daunting task to establish the linking between COs and programme outcome(s) (POs), for each lesson and assessment. In order to facilitate the proper alignment of teaching and learning activities to its respective COs and POs, firstly preset all the CO:PO mapping (based on approved CO:PO matrix) in the course outline as well as lesson plan and update them accordingly. Secondly, request all lecturers to assign the assessments and examination questions with the correct COs:POs. Lecturers involved in the course need to understand well the course content and its CO:PO measurements. Thirdly, for each type of assessment, allocate a table with predetermined COs:POs and scoring marks. Lecturers will then have to fill in the marks in the predesigned table format, which will facilitate the analysis of CO:PO measurements. Then an Excel spreadsheet with proper allocation of COs:POs need to be constructed to capture all assessment marks scored by students. The scores for each CO and PO can then be converted into an average percentage score. Finally, with the average percentage score of COs and POs, the lecturer can proceed with continuous quality improvement (CQI) where a comparison of scores from previous semester(s) can be made. This is to identify any potential drawbacks from the teaching and learning activities, where alternative solutions can be figured out to improve the delivery of the course. With the aforementioned steps, we have found that we were able to systematically measure and analyse COs:POs. The Excel

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spreadsheet not only serves as a crosscheck tool whilst filling but also allow us to continuously monitor and improve the quality of our course.

Keywords Constructive • Alignment • Programme • Quality

1 Introduction

An outcome is a result of learning that reveals what the student should be able to do at the end of a course (Spady 1993). Outcome-based curriculum is a performance-based education system which is crucial in determining the type of graduates we want. In this approach, the desired educational outcomes should be clearly specified. Having an unequivocal outcome facilitates the nature of course offered, its content and also the teaching plans (Harden et al. 1999).

Constructive alignment is a principle used for devising teaching and learning activities and assessment tasks that directly address the learning outcomes (LOs) intended (Biggs and Tang 2007). Constructive alignment is the underpinning concept behind the current requirements for programme specification, declarations of LOs and assessment criteria and the use of criterion-based assessment.

The outcome-based approach provides a mechanism to ensure the accountability and quality assurance to an educational programme. However, many lecturers may find it a daunting task to establish the linking between course outcome(s) (COs) and programme outcome(s) (POs) and the linking between POs and LOs for each lesson, assessment and examination question. In order to facilitate the proper alignment of teaching and learning activities to its respective COs and POs, we recommend a systematic approach to align and analyse the COs:POs for the assessments of a course, in a faster and more user-friendly manner.

2 Methodology

First and foremost, the lecturers needed to define the intended LOs for their courses. The course coordinator needs to ensure that all the CO:PO mapping (based on approved CO:PO matrix) in the course outline as well as the lesson plan had been preset and updated accordingly before the start of the semester. All lecturers were requested to assign the assessments and examination questions with the correct COs:POs on the principle that the lecturers involved in the course have a thorough understanding of the course content and its CO:PO measurements. For each type of assessment (e.g., test/quiz/assignment/final examination), a table containing the predetermined COs:POs and marks allocated was prepared and included in the front/back page of each assessment. During appraisal of the assessment, the awarded marks of each section of the assessment were filled in the predesigned table by the respective lecturers.

Furthermore, a Microsoft Office Excel spreadsheet with proper allocation of COs:POs was also constructed to allow the lecturers to capture all assessment marks scored by students in that group. For each student, the score for each CO and PO was converted into a percentage score and this was followed by calculating an average percentage score of COs and POs for the group of students. The lecturer can then use the average CO:PO percentage score to proceed with continuous quality improvement (CQI) where a comparison of scores from previous semester(s) was made. The CQI is an instrument used to identify any potential drawbacks from the teaching and learning activities, where alternative solutions can be figured out to improve the delivery of the course. Furthermore, test item validation was also conducted. The subject in this study was year 2 Diploma of Pharmacy students in the Faculty of Pharmacy, UiTM Bertam campus. All students gave their consent and voluntarily participated in this study.

3 Results and Discussion

3.1 Course Content

The discussion was based on the course, Basic Pharmacology and Pharmacotherapy of Peripheral Nervous System (PHC214), offered for Diploma of Pharmacy students. The teaching and learning methods used were didactic lectures and small group tutorials. The course introduces the principles and concepts of basic pharmacology that underlies the interactions of chemicals (i.e. drugs) with human biological systems and vice versa. Furthermore, the peripheral nervous system is also taught in this course with emphasis on the various classes of drugs acting on this system. Having that in mind, the three COs of the subject are (1) to describe the body mechanisms and peripheral nervous systems in relation to drugs, (2) to describe the diseases that are common to peripheral nervous systems and (3) to discuss the treatment and the pharmacological classes of drugs in relation to peripheral nervous systems. In term of course assessments, two quizzes, two tests and one final examination were conducted and the COs:POs involved are shown in Table 1.

3.2 CO:PO Matrix

The graduate of Diploma of Pharmacy has very bright prospect in both the hospital and community pharmacy settings. They are highly sought after as a pharmacist assistant or dispenser in public or private hospitals and pharmacies. In parallel with the graduate's work demand and approved CO:PO matrix, two POs, namely, PO1 which is the ability to acquire and apply core knowledge in pharmacy and PO2 which is the ability to instruct patients on the proper administration of prescription and proprietary drugs, under a supervision of a pharmacist, were measured through

Table 1 Course assessment format and the related COs:POs for PHC214

Assessments	Marks	CO:PO	Topics
Quiz 1	5 %	CO1:PO1	Lecture 1–2
Quiz 2	5 %	CO2:PO1	Lecture 7–9
		CO3:PO1	
Test 1	10 %	CO1:PO1	Lecture 3–6
		CO1:PO2	
Test 2	10 %	CO2:PO1	Lecture 10–13
		CO2:PO2	
		CO3:PO1	
		CO3:PO2	
Subtotal	30 %		
Final examination	70 %	CO1:PO1	All topics covered in lectures
		CO2:PO1	
		CO3:PO1	
		CO1:PO2	
		CO2:PO2	
		CO3:PO2	
Total	100 %		

Table 2 Mapping of course assessments with COs and POs

	CO1		CO2		CO3	
Assessments	PO1	PO2	PO1	PO2	PO1	PO2
Quiz 1	√					
Quiz 2			√		√	
Test 1	√	√				
Test 2			√	√	√	√
Final exam	√	√	√	√	√	√

quizzes, tests and final examination. At the end of this course, students are expected to achieve taxonomy domains of up to cognitive level 3 (application of knowledge) (Roziah et al. 2012). The mapping of course assessments with COs and POs is presented in Table 2. In addition, elaboration on teaching and learning methods versus taxonomy domains is presented in Table 3.

A three-cycle model described by Harden and colleagues (Harden et al. 1999) which classified the Dundee 12-outcome model into three dimensions provides a framework for medical programme development. This model has been recommended by few preliminary studies (Kim 2012; Kember 2005) to be employed in other healthcare professional programmes. The three dimensions of this model depict what the graduate is able to do, how the graduate approaches a given task and the development of the graduate's personal attributes. The above study results clearly showed that the course outcome matches the three-cycle model where students are equipped with technical intelligence as well as the ability to apply the knowledge to solve problems.

Table 3 Elaboration on teaching and learning methods versus taxonomy domains

CO	Teaching and learning activities	Taxonomy domain	Description
CO1	Lectures	Cognitive Level 2 (C2): Comprehension	Students should be able to describe how drugs interact and affect human biological systems and vice versa
	Quizzes and tests		
	Discussion		
CO2	Self-revision on previous anatomy and physiology lecture notes on nervous system	Cognitive Level 2 (C2): Comprehension	Students should have prerequisite knowledge on structure and functions of the nervous system in order to relate how diseases may affect its normal physiological functions
	Lectures		
	Quizzes and tests		
	Discussion		
CO3	Lectures	Cognitive Level 3 (C3): Application of knowledge	By understanding the classification and mechanism of action and characteristics of drugs learnt in the peripheral nervous system, students should be able to rationalise the correct use of drugs in treating the specific diseases
	Quizzes and tests		
	Discussion		

3.3 Mapping of the Examination Questions with the Appropriate COs:POs

It is crucial for the alignment with teaching and assessment which is created by the verbs in the intended COs. Thus, teaching is specifically aimed at activating the verb. We also encourage the students to do the explaining and to actively participate in the lecture. Students might listen to each other in pairs and evaluate the quality of each other's explanation, providing feedback using rubrics that define aspects of a good explanation. Students should be unable to complete the assessment tasks unless they enact the same verb that is in the intended COs. Furthermore, students were asked to explain to their tutorial groups about the lesson from lectures on pharmacology and pharmacotherapy of the peripheral nervous system. We pre-empted the matching of CO:PO with the examination questions by asking all lecturers involved to prepare the mapping of the examination questions with the correct and appropriate COs:POs in the form of table. The lecturers also were requested to assign the assessments and examination questions with the appropriate COs:POs (Fig. 1).

For each type of assessment (e.g. test/quiz/assignment/final examination), a table with predetermined COs:POs and marks was included on the front/back page of the printed answer booklet (Fig. 2). The lecturers then have to fill in the marks in the predesigned table format which will facilitate the analysis of CO:PO measurements. An example of the table is presented in Fig. 2.

An Excel spreadsheet with appropriate allocation of COs:POs (Fig. 3) was constructed to capture all assessment marks scored by students. For each student, the score of each CO and PO was converted into a percentage score (Fig. 4).

LEARNING OUTCOMES

At the end of this activity, students should be able to describe the body mechanisms and systems in relation to drugs. (CO1:PO1; CO1:PO2)

ANSWERS

NO.	ANSWERS	MARKS DISTRIBUTION
Q1 CO1:PO1	a) i) Potency: **A measure of drug necessary to produce an effect of a given magnitude**	1 mark
	ii) Efficacy: **The maximal response produced by a drug**.	1 mark
CO1:PO2	b) • Drug B and Drug C has similar efficacy. • Drug B is more potent than Drug C. • Drug A has the least potency and efficacy.	At least 3 correct points, each point carries 1 mark. Total= 3 marks
	c)	
CO1:PO1	i) Agonist: **A drug/ molecule binds to a receptor and produces a biologic response that mimics the response to the endogenous ligand**	1 mark
	ii) Antagonist: **A drug/ molecule that inhibits the action of an agonist but has no effect in the absence of the agonist.**	1 mark

Fig. 1 Table showing the mapping of the examination questions with the correct and appropriate COs:POs

PLEASE FILLS IN MARKS ACCORDINGLY, THANKS.

NO		CO1:PO1	CO2:PO1	CO3:PO1	TOTAL
PART A		18 /20	2 /3	7 /7	27
		CO1:PO2	CO2:PO2	CO3:PO2	
B1		9 /10			9
B2		10 /10			10
B3		10 /10			10
B4		10 /10			10
B5				8.5 /10	8.5
B6	(a)		1 /1		5
	(b)→(d)			4 /9	
B7				10 /10	10
SUB-T		39 /40	1 /1	22.5/29	89.5

PHC214/SEPT2013

Fig. 2 Table with predetermined COs:POs and marks given for a particular student

Bil	No Pelajar	Nama	Program	Kumpulan	QUIZZES (10%)							TESTS (20%)								
					QUIZ 1		QUIZ 2					TEST 1				TEST 2				
					CO1:PO1		CO1:PO1	CO2:PO1	CO3:PO1	TOTAL		CO1:PO1	CO1:PO2	TOTAL		CO2:PO2	CO3:PO2	TOTAL		
					10	5%	5	1	4	10	5%	21	19	40	10%	12	18	30	10%	30%
1			PH110	PH1103A1	8.00	4.00	2.00	1.00	2.00	5.00	2.50	10.50	5.50	16.00	4.00	7.00	10.50	17.50	5.83	16.33
2			PH110	PH1103A1	8.00	4.00	3.00	1.00	3.00	7.00	3.50	19.00	7.00	26.00	6.50	10.00	7.00	17.00	5.67	19.67
3			PH110	PH1103A1	10.00	5.00	5.00	0.00	3.00	8.00	4.00	7.50	4.50	12.00	3.00	9.00	6.50	15.50	5.17	17.17
4			PH110	PH1103A1	7.00	3.50	5.00	1.00	2.00	8.00	4.00	18.50	11.00	29.50	7.38	10.00	18.00	28.00	9.33	24.21
5			PH110	PH1103A1	9.00	4.50	5.00	1.00	4.00	10.00	5.00	16.00	9.00	25.00	6.25	6.00	13.50	19.50	6.50	22.25
6			PH110	PH1103A1	7.00	3.50	5.00	1.00	3.00	9.00	4.50	16.00	6.50	22.50	5.63	9.00	10.00	19.00	6.33	19.96
7			PH110	PH1103A1	8.00	4.00	5.00	1.00	3.00	9.00	4.50	10.50	2.00	12.50	3.13	12.00	15.00	27.00	9.00	20.63
8			PH110	PH1103A1	6.00	3.00	2.00	0.00	3.00	5.00	2.50	4.00	4.50	8.50	2.13	7.00	3.00	10.00	3.33	10.96
9			PH110	PH1103A1	9.00	4.50	4.00	1.00	2.00	7.00	3.50	7.50	5.00	12.50	3.13	4.00	8.00	12.00	4.00	15.13
10			PH110	PH1103A1	8.00	4.00	2.00	1.00	3.00	6.00	3.00	3.50	1.00	4.50	1.13	4.00	5.00	9.00	3.00	11.13
11			PH110	PH1103A1	9.00	4.50	5.00	1.00	2.00	8.00	4.00	13.50	8.50	22.00	5.50	9.00	12.00	21.00	7.00	21.00
12			PH110	PH1103A1	10.00	5.00	4.00	0.00	3.00	7.00	3.50	16.50	8.00	24.50	6.13	10.00	13.00	23.00	7.67	22.29
13			PH110	PH1103A1	9.00	4.50	4.00	1.00	3.00	8.00	4.00	15.00	10.50	25.50	6.38	8.00	13.00	21.00	7.00	21.88
14			PH110	PH1103A1	7.00	3.50	3.00	0.00	1.00	4.00	2.00	7.00	3.50	10.50	2.63	10.00	11.00	21.00	7.00	15.13
15			PH110	PH1103A1	9.00	4.50	4.00	0.00	3.00	7.00	3.50	15.00	13.00	28.00	7.00	11.00	18.00	29.00	9.67	24.67
16			PH110	PH1103A1	8.00	4.00	4.00	0.00	2.00	6.00	3.00	12.00	7.00	19.00	4.75	12.00	13.00	25.00	8.33	20.08
17			PH110	PH1103A1	8.00	4.00	4.00	1.00	1.00	6.00	3.00	14.50	6.50	21.00	5.25	6.00	12.50	18.50	6.17	18.42
18			PH110	PH1103A1	6.00	3.00	5.00	0.00	4.00	9.00	4.50	16.50	15.00	31.50	7.88	11.00	16.00	27.00	9.00	24.38
19			PH110	PH1103A1	7.00	3.50	4.00	1.00	2.00	7.00	3.50	11.50	6.50	18.00	4.50	9.00	13.00	22.00	7.33	18.83
20			PH110	PH1103A1	10.00	5.00	3.00	0.00	2.00	5.00	2.50	19.50	11.00	30.50	7.63	12.00	18.00	30.00	10.00	25.13
21			PH110	PH1103A1	8.00	4.00	4.00	0.00	3.00	7.00	3.50	9.00	3.00	12.00	3.00	6.00	12.00	18.00	6.00	16.50

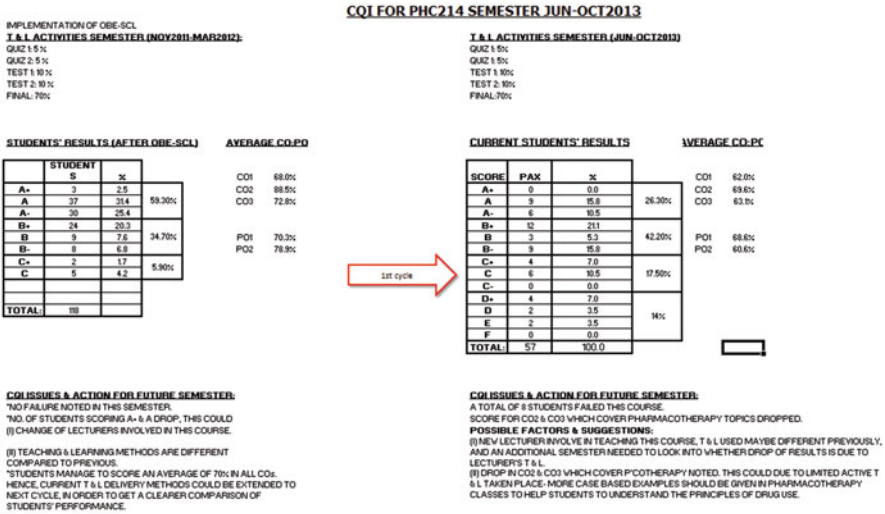
Fig. 3 Example of Excel spreadsheet with appropriate allocation of COs:POs

Bil	No Pelajar	Nama	Program	Kumpulan	COURSE OUTCOMES (COs)						PROGRAMME OUTCOMES (POs)			
					CO1		CO2		CO3		PO1		PO2	
					110	%	17	%	58	%	71	%	119	%
1			PH110	PH1103A1	57.0	51.8	10	58.8	30	51.7	40	55.6	59.5	50.0
2			PH110	PH1103A1	65.0	59.1	14	82.4	34	57.8	55	77.5	60.5	50.8
3			PH110	PH1103A1	48.0	43.6	12	70.6	30	51.7	40	55.6	55.5	46.6
4			PH110	PH1103A1	88.5	80.5	14	82.4	50	86.2	58	81.0	100.0	84.0
5			PH110	PH1103A1	86.0	78.2	9	52.9	35	60.3	53	74.6	82.0	68.9
6			PH110	PH1103A1	82.0	74.5	11	64.7	34	57.8	54	76.1	77.5	65.1
7			PH110	PH1103A1	51.5	46.8	14	82.4	33	56.9	44	61.3	60.0	50.4
8			PH110	PH1103A1	52.0	47.3	10	58.8	25	43.1	33	46.5	56.0	47.1
9			PH110	PH1103A1	46.5	42.3	6	35.3	25	42.2	36	50.0	45.5	38.2
10			PH110	PH1103A1	30.0	27.3	5	29.4	20	33.6	31	43.0	26.0	21.8
11			PH110	PH1103A1	77.0	70.0	13	76.5	35	59.5	52	72.5	78.0	65.5
12			PH110	PH1103A1	89.0	80.9	12	70.6	39	67.2	56	78.2	88.5	74.4
13			PH110	PH1103A1	88.5	80.5	12	70.6	47	80.2	58	81.7	93.0	78.2
14			PH110	PH1103A1	46.5	42.3	12	70.6	32	54.3	34	47.9	59.0	49.6
15			PH110	PH1103A1	90.0	81.8	15	88.2	47	81.0	56	78.9	100.0	84.0
16			PH110	PH1103A1	66.0	60.0	14	82.4	40	69.0	46	64.8	78.0	65.5
17			PH110	PH1103A1	78.5	71.4	10	58.8	38	64.7	52	72.5	78.5	66.0
18			PH110	PH1103A1	90.5	82.3	15	88.2	52	89.7	59	82.4	104.0	87.4
19			PH110	PH1103A1	77.0	70.0	13	76.5	47	81.0	50	69.7	91.5	76.9
20			PH110	PH1103A1	96.0	87.3	15	88.2	46	78.4	59	82.4	101.0	84.9
21			PH110	PH1103A1	55.0	50.0	9	52.9	32	54.3	43	60.6	56.5	47.5

Fig. 4 Example of Excel spreadsheet with scores for each CO and PO presented percentage score

Finally, an average percentage score of COs and POs for the group can be calculated where the lecturer can proceed with CQI where a comparison of scores from previous semester(s) was made. This instrument is extremely useful to identify any potential drawbacks from the teaching and learning activities, where alternative solutions can be figured out to improve the delivery of course. An example of the CQI is presented in Fig. 5.

Outcome-based education is not something new but has been a major exercise for the medical course. Besides, it is also advocated by other healthcare professional courses. The Korean Accreditation Board of Nursing Education supported the execution of this approach (Kim 2012).The School of Pharmacy at the Chinese University of Hong Kong has its own guideline of outcome-based teaching and learning (Kember 2005). The University of Dundee Medical School, one of the leading UK medical schools, who was ranked 5th in the Guardian 2013 University Guide, applied the outcome-based education in 1997. This approach showed a



	STUDENT S	%	
A+	3	2.5	
A	37	31.4	59.30%
A-	30	25.4	
B+	24	20.3	
B	9	7.6	34.70%
B-	8	6.8	
C+	2	1.7	5.90%
C	5	4.2	
TOTAL:	118		

SCORE	PAX	%		
A+	0	0.0		
A	9	15.8	26.30%	
A-	6	10.5		
B+	12	21.1		
B	3	5.3	42.20%	
B-	9	15.8		
C+	4	7.0		
C	6	10.5	17.50%	
C-	0	0.0		
D+	4	7.0		
D	2	3.5	14%	
E	2	3.5		
F	0	0.0		
TOTAL:	57	100.0		

Fig. 5 Example of the CQI for comparison of scores from previous semesters

promising result with higher percentage of its graduates compared to any other medical schools in the UK mentioned that they had been well prepared for their posting (Davis 2003). These indicate that outcome-based education has been well accepted both at the Western and Asian countries.

4 Conclusion

With the practical tips provided, we hope to facilitate all lecturers in analysing the COs:POs in a faster and more systematic manner.

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Blended Learning in Engineering Education: Curriculum Redesign and Development

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Abstract There are both psychomotor and cognitive skills that need to be developed in engineering education. E-learning such as computer-aided design (CAD) and virtual simulation can enhance the learning experience; however, the development for the psychomotor skills is limited. Grounded on the educational theory by Dewey, "learning by doing," the paper presents the revamp of the engineering curriculum development with blended learning. Such redesigning of the engineering design subject used the blend of online tutorials, CAD with face-to-face workshop activities, field trips, and laboratory and in-class activities using modeling compounds to replace most of traditional classroom lectures and tutorials. The methods and implications of the redesign of curriculum are reported. As a result, students' learning experiences were enhanced with the evidence in the subject evaluation report.

Keywords Curriculum content redesign and development • Blended learning • Engineering education

1 Introduction

The engineering education is evolving from the traditional classroom learning and teaching to delivery with e-learning technologies. Loveless suggests that the development for technology in education is a cultural artifact of students and educators and can be different from one subject area to another (Loveless 2006). For learning and teaching in engineering, one of the "cultural artifacts" is computer-aided design (CAD), which students are expected to use competently for engineering functions (Johnson and Diwakaran 2011), or virtual laboratory with engineering-related

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simulations in an online laboratory (Miladin 2013). All these educational technologies can be helpful in terms of time and space saving. However, since the prestigious educational researchers, Bloom and Krathwohl, developed the intellectual behavior in learning domains: affective, psychomotor, and cognitive (Bloom and Krathwohl 1956), the real psychomotor skills seem to be limited in a complete e-learning environment as mentioned above. Although psychomotor skills can be developed through virtual lab or simulators at a certain level (Verdaasdonk et al. 2007), nevertheless, there are other factors that contribute to the learning of psychomotor skills such as the hands-on workshops and real practice sessions as to maximize the actual progression of learners through the learning stages.

Hence, blended learning is considered in the curriculum content redesign and development in engineering education. Blended learning is the process of rethinking and redesigning the engineering education with technologies (Dewey 1997). Such process of "rethinking and redesigning" can lead to the implementation of technological innovation embedded into the learning and teaching or not. Blended learning is taking the best world of face-to face classroom and e-learning, yet complementing the weaknesses of e-learning or traditional classroom, respectively. In the light of Dewey's educational theory (Garrison and Vaughan 2008), "learning by doing" is (1) not merely to know (develop the knowledge) but learning to do (develop the skills) and (2) learning that take place in the environment which is applicable and interesting (Schank et al. 1999). The blended learning framework is based on Dewey's insights of constructivism in terms of seeking practical process to investigate problems. Through such an applicable and interesting learning process, knowledge is constructed (Dewey 1997) and student learning is expected to be enhanced.

Grounded on the above insights, the paper presents a redesigning of an engineering subject with blended learning practice that gave emphasis on the development of psychomotor skills in a leading private university in Malaysia.

2 Method

The selected teaching subject code is MEC2402: Engineering Design. It is an introductory subject to a systematic method of communicating problem definition, design analysis, manufacturing processes, and design choices. The subject is taken by both mechanical and mechatronics engineering students in their second year. In previous years, this subject suffered from low student evaluation scores mainly because it is a challenge to teach a subject with high expectations in cognitive learning domain paired with a huge demand on psychomotor skills. Design problems are typically open ended and most of the content of this subject was traditionally taught using techniques that focus on the cognitive learning domain in a classroom. If the subject demands both high levels of cognitive and psychomotor skills, the learning and teaching process should be carried out with applicable and interesting activities to develop these learning domains such as "learning-by-doing" workshop activities

as suggested by Dewey (Garrison and Vaughan 2008). Thus, the traditional face-to-face classroom teaching was replaced by hands-on workshop-based activities with blended learning activities such as online video tutorials and CAD. Two main enhancements were implemented to enhance students' experience in MEC2402 as detailed in the following sections. Students' experiences for the blended learning were collected through the university's student evaluation survey for teaching subject (quantitative responses) and emails (qualitative responses).

3 Implementation of Arduino Workshop

3.1 Background

The Weir Warman Design and Build Competition has been part of the assignment 1 in MEC2402 since 1999 that makes up 20 % of the course. Prior to 2013, there was not much support provided to students on this project. It was exceedingly difficult for any teams of four members to complete the challenge. For example, none of the original teams (consisting of eight members to build two subsystems) in year 2012 were able to complete the design challenge. Students were struggling to test out an appropriate system to be deployed on devices they have designed within a timeframe of 6 weeks. The challenge became more demanding in recent years which required implementation of a simple microcontroller. For example, in semester 1, 2013, the challenge was to design a ground-based prototype system in a laboratory environment to transport a payload over a defined terrain which includes negotiating a significant crevasse and some obstacles (The National Committee on Engineering Design 2014).

3.2 Initiative

The investigation was commenced for plausible solutions to support students in this course to improve the capabilities of devices they could design and build. The possibility of using the Arduino microcontroller was explored as there are both online and offline learning tutorials (blended learning) with a huge pool of source codes students could use and customize them for the functions they could use for their physical devices. The Arduino is basically an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. Arduino libraries are a helpful way to share code such as device drivers with excellent online guide details on how to install libraries on the computer and what students can do with them (Arduino Libraries 2014). It is intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments (Arduino – Home 2014). The lecturer self-taught program the Arduino by working through some recommended tutorials with the Arduino Experimentation Kit.

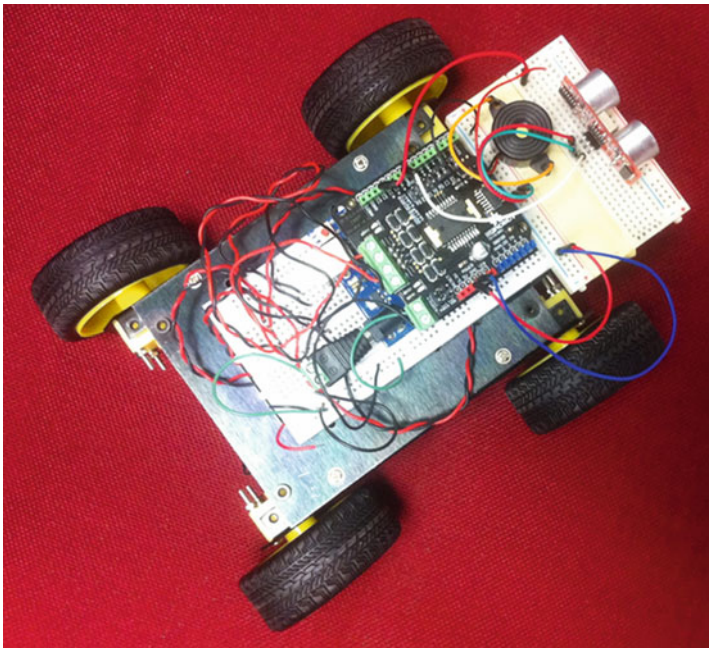

Fig. 1 Simple wall-avoiding robot used for demonstration in Arduino workshop

Early in both semesters of 2013, two of 1-h workshop sessions were scheduled in the course. In the first workshop, students were given the opportunity to try out the most basic tutorial called the "LED blink" exercise with an Arduino board. A simple wall-avoiding robot was demonstrated to students to inspire them to build a similar system in the second workshop. An image of the wall-avoiding robot used in the workshop demonstration is shown in Fig. 1. Each team was provided with an Arduino Basic Kit, two DC motors, and some sensors to test out a simplified version of the wall-avoiding robot. By the third week of the semester, students were able to utilize the Arduino to build their devices.

3.3 Impact and Evidence

Through this series of online learning and interesting workshops, students were exposed to the latest technology for their projects and they acquired more hands-on skills. A total of 5 out of 14 teams in year 2013 were able to complete the task as their devices were able to transmit a payload to the targeted area. The winning team was sent to Sydney for the national final competition. A video clip (Warman Winners, Student Design and Build Competition 2014) shows the implementation of the device designed and built by the winning team. The campus winning team secured 11th place out of 18 teams in the Weir Warman Design and Build Competition among top universities from Australia and New Zealand.

4 Machining Operation and Primary Manufacturing (Casting) Pattern Design

4.1 Background

The most basic machining processes can be described with turning and milling operations. It was evident that many students could not grasp the difference these two basic machining processes as observed in the exams. Many students were not able to visualize how these processes were carried out. This issue caught our attention through the university's outcome-based education process which is mapped to the assessment related to this topic. Students were scoring relatively low in this topic compared to other topics covered in MEC2402. In the light of blended learning and Dewey's educational theory, it is found that the "learning by doing" with hands-on experience and live demonstration of machining processes is the key of learning effectiveness to fully understand this topic. This issue has led to a revamp of how machining and casting technology were taught to students in a blended and applicable way.

4.2 Initiatives

Multiple field trips were organized due to a large class size. In the first visit, students were exposed to automated machining technologies (CNC lathe/turning and CNC milling). They experienced and tried out the computer-aided manufacturing (CAM) to see how these processes were simulated in a computer before the actual machining is done. In the second visit, students were shown how an automated assembly machine was developed from 3D models in computer-aided design/drafting (CAD) software to the assembly line. The components of these automated machines were manufactured in-house with CNC lathe/turning and CNC milling operations. In the final week of the semester, a 2-h workshop was carried out to demonstrate how conventional turning and milling were done. Students were given the opportunity to try out these two processes on a mini-lathe and a mini-milling machine in the project lab. Safety precautions were taken to ensure students were using personal protective equipment (PPE) during the session.

In one of the lab sessions, each pair of students was given a small tub of modeling compound, commonly known as Play-Doh™. They were asked to form a given shape which required some modification so that a pattern could be designed suitable for casting. From this exercise, students were briefed on how the original shape would not be suitable for casting, i.e., sand will be trapped in certain area and it would be difficult to remove the modeling compound from a core without appropriate draft angles. Subsequently, students were coached to modify the shape of the pattern (represented by the modeling compound) to a plausible pattern design suitable for casting.

4.3 Impact and Evidence

Students' achievement in the measured learning outcome improved tremendously based on the improved scores in the final exams for questions related to machining and casting topics. In general, these learning outcomes are measured by the percentage of students achieving more than 50 % of their assessment marks that are mapped to their respective learning outcomes. In semester 2, 2012, the achievement for learning outcome 7 (ability to select the appropriate manufacturing technology and describe the steps involved to produce a desired product) was at 87.1 %, but the measurements shown in semester 1, 2013, have improved to 100 %. The achievement in this particular learning outcome was sustained at 100 % in semester 2, 2013.

5 Overall Quantitative and Qualitative Outcomes

With the effort and innovation introduced to MEC2402 gradually up to both semesters in 2013, the average median distribution scores from a student evaluation tool (Monash University Engineering SETU Template 2014) showed a steep improvement from semester 1, 2012, at 3.13–4.25 in semester 2, 2013. Table 1 below shows how the median distribution scores and their respective averages for each survey question have improved over the last two semesters. Data from both semesters 1 and 2 from year 2012 to 2013 are presented as follows.

In comparison to the faculty average in student evaluation for the teaching subject question 5 on overall satisfaction, MEC2402 scored 4.03 and 4.17 in the most recent two semesters, which is well above the university average at 4.06, faculty average at 4.00, and campus average at 3.92 measured in semester 2, 2013. Informal reviews were provided by several at the end of their semester. A snapshot of several reviews sent by students of MEC2402 is shown in Fig. 2. These responses indicate the enhancement of students' learning experience after the redesigning of the blended learning for MEC2402.

Table 1 Median distribution scores for MEC2402: student evaluation teaching subject

Semester	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Average
2012 S1	3.11	3.06	3.18	3.18	2.96	3.25	3.20	3.29	3.08	3.00	3.13
2012 S2	3.68	3.33	3.58	3.77	3.69	3.45	3.35	3.88	3.65	3.44	3.58
2013 S1	3.98	4.13	3.93	4.06	4.03	4.00	4.03	4.25	4.24	3.59	4.02
2013 S2	4.17	4.50	4.17	4.17	4.17	4.17	4.50	4.50	4.17	4.00	4.25

Fig. 2 Selected student review on MEC2402 sent through emails

6 Conclusion and Future Works

In the context of engineering education, the traditional classroom is limited to cognitive learning (knowledge), whereas e-learning has its limitation for the development of psychomotor skills. Blended learning consists of the conventional classroom teaching approach and e-learning elements within a single teaching subject. Considering the blended learning approach, the learning and teaching method for the subject MEC2402: Engineering Design has been revamped. With the educational passion to improve the unpopular and difficult teaching subject for nearly a decade, the rethinking and redesigning of its curriculum content and development is worthwhile. The improvements shown in the unit evaluation scores are evident and improved student learning experience. However, the limitations of the blended learning implementation are: (1) students still need to spend a lot of their time to develop the knowledge through traditional classroom before attending the workshop activities and (2) there is limited interactive online assessment and feedback

element to enhance the students' self-assessment and feedback experience. Thus, it is suggested that the future work for such a continuous curriculum redesigning is video recording lectures to facilitate a flipped classroom teaching, with an online quiz before attending the hands-on workshops.

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Education Quality and Learning Outcomes in Higher Education Institutions in Pakistan

Muhammad Asif Khan and Muhammad Usman

Abstract This is a causal and cross-sectional research in the area of education quality in higher education institutions (HEIs) in Pakistan. The study explored the dimensions of education quality and examined the effects of education quality and students' engagement in achieving the desirable learning outcomes in HEIs. A sample of 385 university students responded to a structured questionnaire based on variables of teaching excellence, quality of academic programmes, institutional support facilities, students' participation, faculty involvement, institutional environment, students' engagement and the learning outcomes. The hypothesized relationships were examined between education quality and learning outcomes, with students' engagement affecting as moderator between education quality and learning outcomes. Statistical tests of correlation and regression were used to analyse the data. Results showed that education quality had a significant positive relationship with the learning outcomes. Further, students' engagement moderated the relationship between education quality and learning outcomes. The study provided useful insights to administrators and regulators to initiate appropriate interventions to enhance education quality and students' engagement for desirable learning outcomes in HEIs.

Keywords Education quality • Learning outcomes • Students' engagement • Higher education • Pakistan

1 Introduction

Education aims at transforming students and society. Education quality is imperative to transform students in cognitive, social and psychological dimensions with a view to make a meaningful contribution towards society (Lozano and Rowe 2008). In the context of higher education, the quality has become a significant challenge.

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The changing landscape of higher education has offered opportunities and challenges for HEIs that need to be capitalized to achieve strategic institutional objectives (Kwek et al. 2010). Learning outcomes are the fundamentals to a meaningful education. These outcomes manifest in students' cognitive abilities (knowledge), skills and behaviour (affect) during and after completing the education. These provide a framework for identifying the gap between the desired and actual objectives, facilitating evaluation and offering opportunity to affect improvement through appropriate interventions. The paradigm shifts in education and challenging milieu have enhanced the need to critically evaluate these outcomes for sustained effectiveness of higher educational systems.

Quality is imperative for higher education institutions to achieve competitiveness (Hasan et al. 2008; Magd et al. 2003; Yunus et al. 2010). Education quality is primarily determined on the basis of students' experience being the primary stakeholder of educational institutions (Hill et al. 2012; ISO 2007). Disparate studies have debated students' perceived education quality. These studies have been conducted within the context of industrialized states (Athiyaman 1997; Kao 2007; Russell 2005). These studies had, however, identified the need to further explore this phenomenon and examine the association in different cultural contexts for generalizability.

1.1 Purpose of the Study

The strategic vision of the Higher Education Commission of Pakistan envisages HEIs playing a leading role in socio-economic development of the country through growth of enterprising and innovative knowledge workers, fostering development-related research works and building social communities through collaboration (HECP 2011). The Higher Education Commission of Pakistan Medium Term Development Framework I (2005–2010) has not been very successful in realizing the strategic objectives of quality in higher education (faculty development and infrastructure), access and relevance to national needs. According to the mission stipulated in the Medium Term Development Plan II, the Higher Education Commission of Pakistan envisions quality in higher education as the top priority. A number of initiatives have been initiated for a quantitative increase in quality. In addition, a number of soft reforms have been introduced to improve faculty development, leadership and governance in HEIs in Pakistan.

Researchers have examined the service quality in higher education in Pakistan. These studies have used different models to assess service quality. Hameed and Amjad (2011) used Keaveney and Young (1997) framework; Zeeshan (2010) measured service quality through SERVQUAL. Awan et al. (2008) applied total quality management approach in this regard. Another stream of quality-related studies focused on students' satisfaction with the service quality in higher education (Ijaz et al. 2011; Baber and Kashif 2010; Khan 2012; Usman 2010). However, no published research had evaluated the effects of education quality on learning outcomes

based on academic performance, personal development and behavioural change of students in HEIs in Pakistan. In addition, the moderating role of students' engagement in the relationship of education quality and learning outcomes has not been explored in any published research work related to Pakistan. There is a need to fill this gap through empirical evidence to evaluate the effects of education quality on learning outcomes of students in HEIs in Pakistan with a view to identify the requisite direction to achieve the strategic objectives set forth in the Medium Term Development Framework II (2011–2015) of the Higher Education Commission of Pakistan.

1.2 Research Questions

The study attempted to answer the following questions:

(a) What are important dimensions of education quality in higher education?
(b) What is the scope of students' learning outcomes in higher education?
(c) To what extent students' engagement moderates the relationship between education quality and learning outcomes in HEIs in Pakistan.

2 Literature Review

2.1 Teaching Excellence

Due to a changing paradigm, the teaching excellence has become a vital constituent of the university brand (Dahl and Smimou 2011) in knowledge economy. Teaching excellence is characterized by teachers' personal attributes, devotions to education, strong belief in education philosophy, commitment to teaching, teaching experience and focus on relationship. Fernandes et al. (2013) asserted that quality teaching is the core ability bestowed by universities and dominates the perceptions of finished quality. Teachers in higher education are an essential element of the education system. The professional competence of teachers is critical in achieving learning outcomes in higher education (Cochran-smith and Zeichmer 2005). The teacher in higher education should be an innovator, pedagogical activity researcher and team player (Elton 1996; Thomas 1995). Some researchers stressed education level and experiences as the most dominant factors that relate to students' learning (Goldhaber 2002; Heck 2007). The extant literature indicated that teachers' excellence includes an innovative instructional approach, effective classroom management, mastery on the content, commitment to pedagogical philosophy, communication and relationship. These aspects significantly affect students' academic and behavioural outcomes (Chien 2007; Cochran-smith and Lytle 2009; Covington and Müeller 2001; Costa and Oliveira 2012; Dahl and Smimou 2011; Murias et al. 2008; Swail 2011).

2.2 Quality of Academic Programmes

The changing dynamics of higher education, the rapid growth, intense market competitiveness and the unique needs of the labour market have necessitated a diverse cognitive and behavioural competence on the part of graduates for effective employability. This has provided opportunities and challenges to HEIs to introduce and executive novel academic programmes in different disciplines to attract, retain and pass out graduates with a compatible competence level for personal and professional gains in professional lives (Battol and Qureshi 2005). The competitive environment in higher education has necessitated diversified and imaginative programmes compatible with the prevailing market needs and better prospects of employability of graduates. The programmes should develop critical thinking and reasoning (Cortes et al. 2000); comprise of co-curricular and extracurricular activities Gordon (2005); promote learning outcomes; be compatible with societal and market needs (Parayitam et al. 2007); align with national educational policies (Khan 2012); enhance career growth and employability orientation (Khan 2012); exhibit interdisciplinary focus (Elliott 2003); significantly broaden students' outlook and understanding (Jamelske 2009); integrate sociocultural context in the curriculum; provide an enabling environment for the cognitive, behavioural and social development of students; and contribute to national and societal objectives (Brown and Mazzarol 2008; Hallinger and Lu 2013; Helgesen and Nesset 2007; Joseph et al. 2005; Marsh and Cheng 2008; Pascarella and Terenzini 2005).

2.3 Institutional Support Facilities

In knowledge economy, institutional support facilities are significantly important to yield desirable outcomes in intellectual and sociocultural dimensions. Institutional support facilities include physical facilities, information technology-related equipment and facilities, research-related services, libraries and recreational facilities (Kwek et al. 2010; Peng and Samah 2006). These facilities provided a conducive environment for the cognitive and behavioural development of students and contribute towards meaningful learning outcomes (Dawson et al. 2010; Fenandes et al. 2013; Helgesen and Nesset 2007; Ginns and Ellis 2009; Nadiri et al. 2009; Serenko 2011; Sohail and Shaikh 2004; Sumaedi et al. 2012; Tam 2006; Teo and Soutar 2012).

2.4 Students' Participation

Students' participation is multifaceted and includes active participation of students in pedagogic and non-academic activities. According to Astin (1984), this included feedback about academic and non-academic activities, civic engagement work, social activities and industry-related projects. Students' participation in such endeavours shaped their perception about institutional quality (Telford and

Masson 2005). Involvement in such activities enhanced students' understanding of their responsibilities which influence their behaviour (Brown and Mazarol 2008). The desirable outcome of taking part in such activities improved students' social fulfilment and fostered realization towards their positive role in societal development (Helgesen and Nesset 2007; Pace and Kuh 1998). Researchers indicated that students' participation in such pursuits promoted teamwork, tolerance, personality stability and dependability and willingness to adapt to norms of institutions and society and improved their capacities for future employability (Astin 1984, 1999; Bowles and Gintis 1976; Heckman and Rubenstein 2001).

2.5 Faculty Involvement

Faculty involvement focuses on two aspects of faculty-student interaction and governance-related matters. The students' learning has been associated with faculty responsibility of teaching and research. Faculty involvement through purposeful initiatives promoted efforts and motivation of students (Kuh and Hu 2001), promoted students' satisfaction and success and leads to a higher level of self-confidence and academic skills (Astin 1996). Strong support is available in literature that faculty-student interaction in academic and non-academic endeavours positively affected students' learning outcomes and persistence (Ewell and Jones 1996; Tinto 2004). Faculty involvement in university governance had been studied to foster growth of higher education (Flynn 2005; Hollinger 2001; Keeton 1971; Miller 1996). Researchers have found that the changing paradigm of education, market orientation, demanding stakeholders, financial constraints and greater accountability had necessitated a transparent and collaborative approach to governance in HEIs worldwide. This had also highlighted the importance of faculty effective partnership as a strategic partner in institutional governance (Hollinger 2001; Miller 1996; Tinto 1993, 2000). Researchers have established a strong support of faculty participation in governance and superior performance of the HEIs (Miller 2002; Minor 2003, 2005). Strong evidence existed in literature that faculty involvement with students within and outside the classroom positively affected students' academic performance, personal and intellectual development, critical thinking, satisfaction with the faculty, educational aspiration, university satisfaction, perception of institutional image and retention and persistence (Moore et al. 1984; Pantages and Creedon 1978; Pascarella et al. 1978, 1986).

2.6 Institutional Environment

Institutional environment refers to the culture, rules and procedures, programmes and other policies that govern the institutions. Shaping and aligning the institutional environment fosters responsiveness and sustainability of organizations in a dynamic environment. The institutional environment includes institutional vision and mission, leadership, collaboration with stakeholders, planning culture, system maturity,

process sensitivity, professional initiative of faculty, empowerment, willingness to change, learning and renewal (Gladdes and Kennedy 2013). Strong evidence existed in literature that these dimensions of education quality significantly affected students' engagement and learning outcomes (Astin 1996; Brown and Mazzarol 2008; Helgesen and Nesset 2007; Hénard 2010; Glades and Kennedy 2013; Kennedy 2011; Minor 2003; Serenko 2011).

2.7 Students' Engagement

Students' engagement is a multidimensional construct and includes psychological and behavioural components. It refers to students' willingness to actively participate in meaningful learning endeavours both academic and non-academic activities including curriculum development, management of classrooms and building institutional climate. Engagement manifests in students' involvement in their work, enhanced commitment in spite of obstacles and challenges and concerted and visible efforts in achieving learning outcomes (Fletcher 2005; Kenny et al. 1995; Kuh et al. 2008; Newmann 1992; Taylor and Parson 2011; Vandewalle et al. 1995; Willms 2003). Strong evidence is found in literature that quality education significantly affects students' engagement (Karuppan and Barari 2011; Kuh et al. 2008; Stukalina 2011; Yam et al. 2013).

2.8 Learning Outcomes

Learning outcomes entail identity and values, principles of leadership, cross-cultural competency, interpersonal and team work, creative and critical thinking communication and information and quantitative literacy (Zhang 2005). Learning outcomes encompass academic performance, personal development and behavioural change. In this study the academic performance has been measured through the GPA of students (McFarland and Hamilton 2006). Personal development included the oral and written expression, self-improvement and personality development, expressive and creative qualities and interpersonal and social skills (Stukalina 2011). According to Parasuraman et al. (1994), behavioural change involved intangible improvements in personality, habit of reading, participation, proactive approach towards problems and logic and critical reasoning. Behavioural change has been linked with overall learning outcomes (Lien and Yu 2001).

2.9 Statement of Hypotheses

H1: Teaching excellence has positive influence on learning outcomes.
H2: Quality of academic programmes predicts learning outcomes.
H3: Institutional support facilities positively affect learning outcomes.

H4: Students' participation has positive influence on learning outcomes.
H5: Faculty involvement has positive effect on learning outcomes.
H6: Institutional environment positively influences learning outcomes.
H7: Education quality predicts learning outcomes.
H8: Students' engagement moderates relationship between education quality and learning outcomes.

3 Methodology

This was a cross-sectional and causal study designed to evaluate the effects of education quality on learning outcomes in HEIs. A structured questionnaire had been used to collect the data from a sample of 385 students of HEIs. A non-probability convenience sampling strategy had been used to collect the data which was analysed using the Statistical Package of Social Sciences 20 software. The instrument has been adapted from different studies. Teachers excellence (five items), quality of academic programmes (seven items), institutional support facilities (seven items), students' participation (five items) and faculty involvement (six items) were adapted from HECP (2005) and Méndez and Gummesson (2012). Students' engagement (six items), personal development (five items) and behavioural change (six items) were adapted from studies of Lee (2006), Van de Welle et al. (2010), Prasuraman et al. (1994) and Sultan and Wong (2012), respectively. A five-point Likert scale was used to measure the response. Pilot testing of the instrument reflected adequate reliability as recommended by Nunnally (1978). Descriptive statistics, correlation and regression analyses were used to analyse the data.

4 Results (Table 1)

Table 1 Descriptive statistics and reliability

Variables alpha	Minimum	Maximum	Mean	S.D.	Skewness	Kurtosis
TE 0.682	2.00	5.00	3.74	0.553	–0.048	1.408
QAP 0.700	3.00	5.00	3.77	0.590	0.107	–0.442
ISF 0.782	2.00	5.00	3.77	0.721	–0.086	–0.319
SP 0.743	2.00	5.00	3.86	0.593	–0.777	1.736
FI 0.900	2.00	5.00	3.83	0.610	–0.418	1.885
IE 0.798	2.00	4.00	3.69	0.575	–0.670	1.754
SE 0.758	3.00	5.00	3.77	0.484	–0.503	–0.085
PD 0.798	2.00	5.00	3.89	0.623	–0.632	1.328
BC 0.789	2.00	5.00	3.80	0.524	–0.390	1.775

TE teaching excellence, *QAP* quality of academic programmes, *ISF* institutional support facilities, *SP* students' participation, *FI* faulty involvement, *IE* institutional environment, *SE* students' engagement, *PD* personal development, *BC* behavioural change
$N = 385$

Results of the descriptive statistics in Table 1 indicated adequacy of data with regard to normality. The results showed general agreement of respondents to the variables of the study. The reliability of each scale and the entire instrument (0.770) was within acceptable range (Hair et al. 1998; Leech et al. 2005).

Pearson correlation was used to examine the correlation among the variables. Table 2 showed that all variables are associated with each other and have significant correlations.

Regression analysis was done to examine the hypothesized relationship. The results in Table 3 found that all dimensions of quality education except quality of academic programmes and students' participation had a statistically significant relationship with learning outcomes.

Barron and Kenny (1986) method had been used to investigate the role of students' engagement in the relationship of education quality and learning outcomes. The results in Table 4 highlighted that students' engagement moderates this relationship.

Table 2 Correlation matrix

	TE	QAP	ISF	SP	FI	IE	SE	PD	BC	GPA	LO	QE
TE	1											
QAP	.433**	1										
ISF	.139**	.280**	1									
SP	−.025	.234**	−.143**	1								
FI	.209**	.289**	.171**	.091	1							
IE	.015	.378**	.379**	.120*	.418**	1						
SE	.101*	.318**	.178**	−.114*	.255**	−.053	1					
PD	.413**	.396**	.260**	−.044	.250**	.219**	.198**	1				
BC	.118*	.130*	−.121*	.000	.251**	−.019	.384**	.281**	1			
GPA	.208**	−.067	.299**	.098	.098	−.150**	.130*	.420**	.019	1		
LO	.361**	.229**	.220**	.023	.283**	.035	.328**	.831**	.587**	.688**	1	
QE	.491**	.745**	.572**	.352**	.625**	.670**	.205**	.430**	.094	.154**	.333*	1

**Correlation is significant at the level 0.01 level (2-tailed)
*Correlation is significant at the level 0.05 level (2-tailed)

Table 3 Hypotheses testing

Variables	Path effects	Beta	*T* value	Significance
TF[a]	+	0.268	5.083	0.000
QAP[a]	−	0.038	0.647	0.518
ISF[a]	+	0.201	3.886	0.000
SP[a]	+	0.047	0.967	0.334
FI[a]	+	0.248	4.800	0.000
IE[a]	+	0.168	2.964	0.000

$R = 0.456$; R squared = 0.26.5; adjusted R squared = 21.5; F = 17.226, $p < 0.01$
[a]Predictors: *TE* teaching excellence, *QAP* quality of academic programmes, *ISF* institutional support facilities, *SP* students' participation, *FI* faulty involvement, *IE* institutional environment
[b]Dependent variable: learning outcomes

Table 4 Results of moderation

Steps	IV		DV	R^2	F stat	B	Beta	*t* value	Sig.
1	EQ (IV)	⟶	LO (DV)	0.111	47.875	0.384	0.333	6.919	0.000**
2	EQ (IV)	⟶	SE (MV)	0.165	75.487	0.645	0.406	8.688	0.000**
3	SE (MV)	⟶	LO (DV)	0.089	37.327	0.216	0.298	6.110	0.000**
4	(EQ x SE)	⟶	LO (DV)	0.168	77.272	0.067	0.410	8.790	0.000**

EQ education quality, *SE* students' engagement
**Significance level $p < 0.01$

5 Discussion

The study had examined the effect of education quality on students' learning outcomes (academic performance (GPA), personal development and behavioural change) as well as the moderating role of students' engagement in this relationship. The results indicated that hypothesized relationship based on dimensions of education quality comprising of teachers' excellence, students' participation, faculty involvement and institutional environment significantly affects learning outcomes. Moreover, the results showed that students' engagement mediates the hypothesized relationship. The results are in harmony with the earlier studies (Bayraktar et al. 2008; Brown and Mazzarol 2008; Ehigie et al. 2006; Lee 2006; Méndez and Gummesson 2012; Parasuraman et al. 1996; Tam 2006; Van de Walle et al. 2010).

The hypothesized relationship of quality of academic programmes and learning outcomes has not been significant. This is attributed to the contextual dimension peculiar to this study. The academic programmes need to be based on market orientation philosophy. The academic programmes should align with the market-driven strategy and provide superior value to the students. Academic programmes lacking diversity, employability and market focus offer opportunities to demonstrate dissatisfaction from these programmes. Programmes that are deficient of vibrant curriculum compatible with the changing paradigm and prevalent societal values breed discontent (Kotler 2011; Kirkwood and Price 2005; Kwek et al. 2010; Lu 2013). Students' participation is an essential dimension of education quality and significantly affects learning outcomes. The results of the present study do not support the hypothesized relationship. This is attributed to institutional and contextual factors. Institutional infrastructure, culture and administrators' and faculty orientation are important determinants of participation. The prevailing organizational culture in HEIs is based on authoritative style. This culture does not lend empowerment to students and discourages initiatives in providing opportunities to students to share the decision making in academic- and non-academic-related matter. Inadequate infrastructure, hostile classroom environment and inappropriate pedagogical approaches discourage students to have a voice in planning, implementing and evaluating academic and non-academic activities. The prevalence of such confuting environment results in students' dissatisfaction and yields undesirable learning outcomes in the form of poor academic performance, retards development of students

and results in undesirable behavioural outcomes with regard to students (Telford and Masson 2005). The study also validates the moderating role of students' engagement in the relationship of quality education and learning outcomes. Enhanced student engagement significantly contributes towards students' satisfaction, superior academic performance, personal development and growth, improved social responsibility and positive behavioural outcomes. The moderation results are supported by earlier studies (Carini et al. 2006; Hallinger and Lu 2013).

The study provides insight into the phenomenon of a complex issue facing higher education in developing economies. The study makes a meaningful contribution in the literature with regard to the concept of education quality in HEIs. The study provides opportunities to administrators and regulators to initiate appropriate interventions to enhance and sustain quality initiatives by the Higher Education Commission of Pakistan as envisaged in the Medium Term Development Framework II. These initiatives need to be implemented through a collaborative approach including all stakeholders and embedded with an effective monitoring and evaluative mechanisms to achieve strategic objectives of higher education in Pakistan.

The study has limitations with regard to specific dimensions of education quality, convenience sampling strategy and the time horizon. In addition, the scope of learning outcomes has been limited to a few variables. Future study may enhance the scope of education quality and the learning outcomes with additional dimensions. Moreover, a longitudinal approach may be used to study the hypothesized relationship.

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Are Future Teachers Ready to Be the ICT Change Agents?

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Abstract The declaration of the Malaysia's Vision 2020 to become a fully developed country has demanded a major transformation of its education system through the advancement of information and communications technology (ICT). Initiatives to promote the integration of ICT in the Malaysian education system have been started since the early 1990s. However, the implementation of those initiatives was not reflected in the successful uptake of ICT among Malaysian teachers. Given the importance and consideration of research that has been undertaken, this study was set to examine the readiness of Malaysian future teachers in becoming the ICT change agents. The technology acceptance model (TAM) was used as a theoretical grounding of the study. Based on TAM, an individual's perceived usefulness (PU), perceived ease of use (PEoU), and attitude (ATT) were three specific beliefs that determine their readiness to integrate ICT. Data were gathered from 200 final semester future teachers in a Malaysian public university. The partial least squares (PLS) of variance-based structural equation modeling (SEM) was used to test the research hypotheses of the study. The findings of the study suggest that future teachers' PU, PEoU, and ATT were able to explain 65 % of the variance toward their readiness to integrate ICT. It is expected that findings derived from this study will contribute toward assisting the teachers' training institution and the Ministry of Education in ensuring all teachers would pose instilled degree of innovative practice using ICT by the year 2020.

Keywords Information and communications technology (ICT) • Future teachers • Technology acceptance model (TAM)

1 Introduction

Malaysia has set a long-term vision, known as Vision 2020, of becoming a world developed country through economic, political, social, spiritual, psychological, and intellectual growth (Mohammad 1991). Information and communications

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technology (ICT) has been identified as one of the key foundations that facilitate achievement of this nation's vision. In accord to rapid development of ICT, the Ministry of Education has also been proactive in integrating ICT into teachers' classroom instruction. The existing curriculum, pedagogy, assessment, teaching, and learning materials have been reviewed and improvised through the advancement of ICT.

The inclusion of ICT into the national educational system has been influenced by the proliferation and prospect of ICT in assisting learners. For instance, Davies and Merchant (2009) saw learning with ICT has enhanced the student's thinking abilities. Students will have the opportunity to construct their own representation of knowledge, which results in an active, constructive, intentional, cooperative, and authentic learning experience. The rapid development of ICT has also allowed students to interact and collaborate with each other, thus promoting the development of learning through knowledge sharing, distributed cognition, motivation, and meaningful experiences (Reich et al. 2012).

With the abovementioned benefits of ICT in education, emphasis must now be given to teachers in making significant adjustments to their teaching and instructional processes. As Schoepp (2005) has argued, a teacher as a change agent will be the determining factor toward any education change. Given this argument, this study is set out to determine the Malaysian future teachers' readiness to integrate ICT into their classroom instruction. Focus was given on their perceptions (perceived usefulness and perceived ease of use) and attitude toward ICT as influential factors toward their readiness to embark into ICT-mediated classroom instruction. In light of a published study that focuses on theory-based research, it is expected that findings derived from this study would assist teachers, school administrators, teachers' training institutions, and the Ministry of Education.

2 Teachers' Readiness to Integrate ICT

Numerous studies and theories have been put forward to determine teachers' readiness to integrate ICT. Among many theories and models of technology adoption, the technology acceptance model (TAM) has become the most widely used in explaining individuals' reason for using technology and attitude toward it. Perceived usefulness (PU) and perceived ease of use (PEoU) were two specific beliefs of TAM that determine an individual's attitude (ATT) or/and decision to use a technology.

Defined as an individual's degree of belief that using particular technology will enhance job performance, various researchers have supported the arguments that an individual's PU has a significant direct effect on their usage behavior (i.e., Lai et al. 2012; Su et al. 2013). For instance, findings from Teo and Schaik's (2012) study have found that the more useful teachers perceive the course website to be, the more acceptable it becomes. Given these statements and findings, it is hypothesized that:

H_1: Future teachers' PU has a significant influence on their readiness to integrate ICT.

Similarly, perceived ease of use (PEoU), which is defined as an individual's degree of belief that using a particular technology will be free from effort, has a direct determinant of individuals' usage behavior. In other words, users have a high expectation about acquiring the expected performance when they feel that the proposed technology is easy to use and does not require much effort. This finding is consistent with those studies by Teo (2011) and Ramayah (2010). Considering these justifications, the second hypothesis was formulated as:

H_2: Future teachers' PEoU has a significant influence on their readiness to integrate ICT.

Another significant predictor of the intention to use proposed technology is users' attitude (ATT). A study by Teo and Schaik (2012) has determined ATT as having the greatest impact toward users' technology use across four technology adoption models (TRA, TPB, TAM, and TAM2). In similar vein, Lai et al.'s (2012) study on factors influencing Hong Kong student teachers' use of technology for learning has found a significant total effect of 0.18, which conclude that student teachers' ATT was a dominant determinant of their technology use for learning. The hypothesis arising from these findings was proposed as:

H_3: Future teachers' ATT has a significant influence on their readiness to integrate ICT.

An additional method used to determine future teachers' readiness to integrate ICT is by accessing their current use of ICT. In doing so the six stages of ICT adoption model as proposed by Russell (1996) was applied. A determinant-choice question (fixed – alternative questions) was employed, where future teachers were required to choose their stages of ICT integration in the teaching and learning. Table 1 provides an overview of the stages.

Table 1 Six stages of ICT adoption

Stage	Descriptions
Stage 1: awareness	Aware that integrated technology tools exist but has not used them; perhaps even avoids them
Stage 2: learning the process	Trying to learn the basics; often frustrated using integrated technologies; lack confidence
Stage 3: understanding and applying the process	Beginning to understand the process of using integrated technologies; can think of specific tasks in which they might be useful
Stage 4: familiarity and confidence	Starting to feel comfortable using integrated technologies for specific tasks
Stage 5: adaptation to other context	Thinks about integrated technologies as learning tools; no longer concerned about them; can use them in many applications and as instructional aids
Stage 6: creative application to new contexts	Able to use integrated technologies in an instructional way to integrate curriculum

3 Research Methodology

The data gathered for this study were obtained using a self-administered questionnaire survey from 200 final semester future teachers in a Malaysian public university. In managing the data analysis process, all collected data were analyzed in two stages. The first stage involved the analysis of descriptive statistic, namely, frequency and percentage. The second stage estimated a series of interrelated dependence relationship simultaneously. In terms of reliability and validity of the instrument, all four subsection measurements were reported as high (exceeding 0.85), which verified the reliability and accuracy of the questionnaire.

4 Research Findings and Discussions

Based on future teachers' self-reported response, their frequency and percentage of stage of ICT integration is presented in Table 2. It is apparent that very few (3.5 %) of the future teachers are at the highest stage (stage 6), creative application to a new context. Majority (51.5 %) of the future teachers was found to be at stage 4 (familiarity and confidence). Generally, this data concludes that majority of future teachers' usage of ICT applications is still limited to specific tasks. This finding is quite salutary when compared to other studies (i.e., Agyei and Voogt 2011; Mouza 2008). For instance, Mohd Khairezan's (2010) study suggested that a teacher's access to high-quality professional development courses and the technology itself could bring them to the highest stage of technology application.

The partial least squares (PLS) of variance-based structural equation modeling (SEM) was used to test the research hypotheses of the study. The significant t-value ($p<0.05$) and the standardized beta value were used to interpret the result. As shown in Table 3, there was a significant ($p<0.01$) relationship between future teachers' PU toward their readiness to integrate ICT. The standardized coefficient beta value is recorded as 0.18 ($t=3.28$, $p<0.01$), thus notifies that research hypothesis H1 is accepted.

Conversely, although finding from the direct path of the PLS statistical model suggests that the relationship between future teachers PEoU toward readiness to

Table 2 Frequency and percentage of the VAE teachers' stages of ICT integration

Stage	Frequency (n)	Percentage (%)
Stage 1: awareness	0	0.0
Stage 2: learning the process	3	1.5
Stage 3: understanding and applying the process	35	17.5
Stage 4: familiarity and confidence	103	51.5
Stage 5: adaptation to other context	52	26.0
Stage 6: creative application to new context	7	3.5

Note. $n=200$

Table 3 *t*-statistic and path coefficient for structural model

Independent to dependent variables	*t*-statistic	Path coefficient
Perceived usefulness (PU) → readiness to integrate ICT	3.28**	0.18
Perceived ease of use (PEoU) → readiness to integrate ICT	1.08	0.05
Attitude (ATT) → readiness to integrate ICT	0.62	−0.02
Perceived usefulness (PU) → attitude (ATT)	7.22***	0.40
Perceived ease of use (PEoU) → attitude (ATT)	3.16**	0.19

Note. *$p<0.05$ level; **$p<0.01$ level; ***$p<0.001$ level

Table 4 Mediation analysis of teachers' readiness to integrate ICT

Raw bivariate correlation	0.275*
Direct effect of PEoU to readiness to integrate ICT	0.154 (56 %)
Indirect effect as mediated through PU	0.120 (44 %)
Total effect as shown in the model	0.274

Note. *$p<0.01$

integrate ICT is not significant (Table 3), a result on a bivariate analysis ($r=0.275$, $p<0.01$) shows that this relationship was being mediated through PU ($t=0.12$) within the depicted model. This result suggests that even though future teachers may perceive ICT as being easy to use, they are unlikely to adopt it without knowing its usefulness. Finally, as shown in Table 3, there was no significant ($p>0.05$) relationship between future teachers' ATT toward their readiness to integrate ICT. The standardized coefficient beta value is recorded as 0.062, thus notifying that the research hypothesis H3 is rejected. This finding is in line with the suggestion that having the right ATT does not necessarily translate into action (Table 4).

5 Conclusion

The results of this study have provided some insights into how ready Malaysian future teachers are to be a change agent toward integrating ICT into teaching and learning. Base on the results, this study summarized that future teachers' readiness to integrate ICT were at the moderate stage (familiarity and confidence) where they are starting to feel confident in using a variety of ICT applications for specific tasks. Given these arguments, the present findings suggest that Malaysian future teachers need to be exposed to continuous technological and pedagogical professional development courses. Apart from their preservice training, more in-service training courses are needed to update teachers with more advanced use of ICT. The conduct of professional development courses that are tailored to meet teachers' specific needs and match pedagogical approaches and institutional setup is also recommended.

Another important finding was that teachers' perceptions about the usefulness and ease of use of ICT were important predictors of their attitude and readiness to integrate ICT. Based on these results, it is clear that future teachers will develop a positive attitude and readiness to integrate ICT when the use of ICT is perceived to be an enhancement to their productivity and relatively free of effort. Furthermore, the significant mediation effect of teachers' perceived usefulness on the relationship between future teachers' perceived ease of use toward their attitude showed that teachers need to perceive ICT as a useful tool before deciding either to accept or to reject it. It is therefore recommended that the curriculum for Malaysian future teachers' training program should focus on creative and innovative use of ICT tools. This idea will then ensure that all teachers pose the same technology-related knowledge and experiences, thus suitably preparing them to be the change agent of educational change.

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The Influence of Mobile Learning on Learner's Absorptive Capacity: A Case of Bring-Your-Own-Device (BYOD) Learning Environment

Ree C. Ho and Hiang K. Chua

Abstract Adopting new technologies in education for a better learning experience is one which is constantly evolving. The absorptive capacity in gaining knowledge among learners can be greatly influenced especially when it comes to using mobile devices via the concept of bring your own device (BYOD). This has provided the platform to understand the learning process in acquiring learning materials which are not directly provided by the teachers previously. This study examines the functionalities of BYOD and if it facilitated the improvement of the students' performance and whether the absorptive capacity is higher in an environment which is more interactive and engaging. This study adopted a theoretical model which incorporated the main constructs of the absorptive capacity framework. The sample size was 128 students from a tertiary business school and data collection via a survey questionnaire. As a result, this study can be used as a reference point for tertiary educators and teachers to understand the adoption of mobile devices in the BYOD environment for better learning processes. Specifically, personalised learning experience and collaboration among students should be promoted.

Keywords Mobile learning • Bring your own device • Absorptive capacity • Collaborative learning

1 Introduction

Using the Internet as the platform for learning is common today. This was made possible through the use of learning management system (LMS) which adopts the Internet to aid the learning process (Hamish et al. 2005). The transition from the Internet to contemporary platforms like mobile technology has been growing

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rapidly in recent years. This is more apparent today in universities (Looi et al. 2010; Callum and Jeffery 2013) in light of a major paradigm shift in the education sector.

Mobile learning today is very encouraged in education in the tertiary level. Among the most significant initiatives that complement this scenario is the introduction of the BYOD concept, popularly known as 'Bring Your Own Device' (Sangani 2013).

With the current technological trend and the constant changes in the learning styles, a shift in the acceptance of mobile learning is expected (Vafa and Chico 2013). In this context, it must be noted that mobile learning is closely associated with knowledge management. This is because it involves several significant traits of this discipline. The ubiquitous nature of mobile learning would allow knowledge to be disseminated more effectively (Tremblay 2010). This was further supported by Lai et al. (2007). Their study found that through mobile learning, experiential learning is more possible, resulting in better knowledge creation.

However, there is still a dearth of research and related studies that investigate and explain how the learners can develop the knowledge management process in the mobile learning environment. A related attempt was made in using absorptive capacity which describes one's ability to learn and apply new knowledge captured (Cohen and Levinthal 1990). As it provided the theoretical lens in reinforcing the learners' knowledge acquisition and application, this study will investigate how absorptive capacity of the student can be improved by using mobile technology.

2 Literature Review

Institutes of higher learning (IHL) today are very different than they were many years before. Today, IHLs are using modern platforms like mobile technology as ways to enhance the learning process, largely due to its ubiquitous feature (Callum and Jeffrey 2013). As such, mobile learning is now irrefutable, allowing students to learn at any time and any place convenient. There is actually a direct linkage between knowledge management and mobile learning (Lai et al. 2007).

Besides that, there have been other theories derived from researches pertaining to mobile learning. This includes one by Wagner (2005) who found that in order for learning to be effective using mobile technology, it must be blended and integrated well with learning materials. This will ensure that the knowledge acquisition process is successful. According to Motiwalla (2007), the dangers of information overload were outlined as it could detriment the process of knowledge acquisition, while Taylor et al. (2006) developed a task model for mobile devices which can capture media like images and notes into a knowledge map through a web-based learning platform. In this study, the importance of personal mobile systems for lifelong learning was emphasised.

As such, it is the intention of this study to investigate how knowledge is gained in the BYOD environment via the concept of a learning environment with social interaction (Vygotsky 1978). It must then be supported with the relevant learning tools (Wertsch 1991) and under a specific and relevant time-space perspective (Kearney et al. 2012).

2.1 Bring Your Own Device (BYOD)

The dependency on mobile devices like mobile phones and tablets among students has become very common. Students use these devices for social interaction and entertainment where they are connected to social networks and such (Sangani 2013). This scenario makes BYOD all the more prominent as the platform that can promote mobile learning.

When mobile devices are used in the learning process, coupled with the fact that students are already very accustomed to using these devices, it would naturally move towards motivating them to be more independent and cultivate more self-directed learning practices. It would then allow students to augment their own learning process and become more engage with the lesson (Kenny et al. 2009).

With BYOD, mobile learning could have a positive influence on the student learning performance as it can deliver learning materials to the students easily (Chang et al. 2011). As such, it is clear that mobile learning is providing the relevant knowledge for a more improved learning process among students (Wagner 2005).

2.2 Absorptive Capacity

The absorptive capacity (AC) theory was developed by Cohen and Levinthal (1990) which described the ability of a learner in using past experiences in increasing the ability to learn and to apply new knowledge during the learning process. Acquisition and assimilation are part of potential absorptive capacity, while the transformation and exploitation phases are part of realised absorptive capacity (Zahra and George 2002).

According to AC, the surroundings of the learning environment of the learner would influence the knowledge transfer, while it was theorised that learners will use activities which are relevant to them to improve their ability to learn and assimilate external knowledge.

2.3 Mobile Learning

The development and expansion of mobile learning has gained a lot of attention among researchers and experts in the education sector. Several frameworks have been developed and promoted in the mobile learning spectrum which includes FRAME or Framework for the Rational Analysis of Mobile Education model by Koole (2009). This model emphasised on constructivism which found that in order to maximise the full potential of mobile devices as a learning platform, several aspects must be considered which include the device, social and the learners' aspect.

Meanwhile, a more pedagogical approach was taken by Kearney et al. (2012) which was carried out based on time-space contexts. Comparatively, the Kearney's framework was more suitable for the BYOD setting. A BYOD setting can only be implemented on limited time and space which depends on the scenario which is time and classroom specific as carried out in this research.

2.4 Authenticity

The authenticity aspect was applied in this research based on Kearney's (2012) framework focused on the learning environment in education. A particular pedagogical method which converge the learning environment and the real world would be desired if the process is to be authentic and effective. Radinsky et al. (2001) suggested that authentic learning can be possible using a simulated model for learning which apply real business scenarios. When mobile technology is used, real-world contexts can be adopted in the classroom quickly and efficiently for the students. This indicates a strong possibility technological support for experiential learning in the classroom.

As such, the hypothesis for this aspect would be as follows:

H_1: Authenticity dimension of BYOD influences potential absorptive capacity.
H_2: Authenticity dimension of BYOD influences realised absorptive capacity.

2.5 Collaboration

This aspect suggests that mobile learning will cultivate better collaboration which is based on the sociocultural theory involving conversation and dialogue by Vygotsky (1978). The theory was further supported by several other teaching and learning research projects (Taylors et al. 2006; Park 2011). Today, mobile learning offers a number of interfaces like blogs, LMS and social media. Cohen and Levinthal (1990) found that the stakeholders' relationship has become closer, and that will achieve better absorptive capacity. In collaboration, more innovative thinking can be cultivated and better encouraged where students can be connected for knowledge sharing, technology transfer and discussion of ideas and thoughts. Besides that, the mobile platform provides an ideal avenue for the transfer of tacit knowledge which will now improve the students' absorptive capacity when collaboration is used in the education setting. Hence, the hypothesis for collaboration is as follows:

H_3: Collaboration dimension of BYOD influences potential absorptive capacity.
H_4: Collaboration dimension of BYOD influences realised absorptive capacity.

2.6 Personalisation

Personalisation emphasises on self-directed learning among learners. Mobile technology will inadvertently promote self-directed learning. This will then cultivate more independent learning because the learners can learn at their own convenience and gear towards their own respective study goals. Students can now connect with their classmates and project groups through the use of online forums and social media, and learning can involve participation of members that they choose. In other words, students can now choose what to learn and select who they want to learn with. When personalisation is possible, it makes self-directed learning more effective, which sets the pace for an individualised mobile learning concept (Looi et al. 2010). The hypothesis for this feature is as follows:

H_5: Personalisation dimension of BYOD influences potential absorptive capacity.
H_6: Personalisation dimension of BYOD influences realised absorptive capacity.

3 Research Methodology

To complete this study, a research sample involving undergraduate students enrolled in a business course in Malaysia was applied. The BYOD concept was practised in this school and was an appropriate model adopted for this study. This is because the undergraduate students in the business discipline were already using digital devices to carry out and complete classroom activities and exercises.

The questionnaire derived was personally administered to ensure a good response rate from the samples. In total, 160 questionnaires were distributed with 128 usable sets returned. This constitutes to 80 % return rate. The design of the questionnaire adopted the instrument scale adapted from previous studies in absorptive capacity (Jansen et al. 2005; Flatten et al. 2011) and student learning (Logan et al. 2006; Midgley 2006; Wood et al. 2008; Lee and Tsai 2011) which have proven validity and reliability.

4 Data Analysis and Findings

For the data analysis stage, the exploratory factor analysis was conducted. The component principle analysis with varimax rotation was carried out to determine the common factors with four factors determined for BYOD environment and two factors for absorptive capacity. In order to test the suitability of the data collected in this study, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy test and Bartlett's test of sphericity were carried out. The results derived were favourable as the KMO recorded a value of 0.892, while the Bartlett's test was significant.

4.1 Measurement Model

This was then followed by a 2-stage confirmatory factor analysis (Anderson and Gerbin 1988), measurement model and structural model. In order to test the convergent and discriminant validity, the measurement model was applied. This provided the platform to assess the Cronbach's alpha coefficient and composite reliability, respectively, in Table 1. Hence, the convergent validity was achieved as both tests achieved acceptable threshold values. These tests confirm that the measurement model was good.

4.2 Structural Model

After that, structural equation modelling (SEM) was used to test the hypotheses formulated in the conceptual model. Partial least squares method, a component-based SEM, was carried out for the confirmatory factor analysis. This model was applied because it involved the impact of a block of independent variable on a block of dependent variable.

The goodness of fit for the model was confirmed with R^2 values. The R^2 value of 0.409 demonstrated substantial percentage of variance that was able to explain potential absorptive capacity. Furthermore, R^2 of 0.439 showed that substantial percentage of variance was able to explain realised absorptive capacity (as shown in Table 2).

Hypothesis testing was conducted with relevant test results to assess the conceptual model developed. The results are summarised in Table 3. Collaboration and

Table 1 Measurement model test results

	AVE	Composite reliability	R^2	Cronbach's alpha
Authenticity	0.659	0.886	–	0.831
Collaboration	0.695	0.919	–	0.890
Personalisation	0.566	0.834	0.409	0.745
Potential AC	0.699	0.920	–	0.892
Realised AC	0.684	0.897	0.439	0.846

Table 2 Structural model test results

Path	Path coefficient	Sample mean	Standard error	*T*-value	*P*-value
Authenticity → potential AC	0.259	0.263	0.086	3.010	0.003
Authenticity → realised AC	0.131	0.137	0.099	1.314	0.191
Collaboration → potential AC	0.255	0.256	0.101	2.521	0.013
Collaboration → realised AC	0.273	0.284	0.118	2.319	0.022
Personalisation → potential AC	0.243	0.249	0.109	2.222	0.028
Personalisation → realised AC	0.364	0.359	0.110	3.299	0.001

Table 3 Hypothesis testing

No	Hypothesis	Path	Significance
1	H_1	Authenticity → potential AC	Supported
2	H_2	Authenticity → realised AC	Not supported
3	H_3	Collaboration → potential AC	Supported
4	H_4	Collaboration → realised AC	Supported
5	H_5	Personalisation → potential AC	Supported
6	H_6	Personalisation → realised AC	Supported

personalisation dimensions of BYOD have demonstrated their influences on both potential absorptive capacity and realised absorptive capacity. Meanwhile, personalisation influences potential absorptive capacity and realised absorptive capacity. However, authenticity dimension has mixed results. It exerted influences on potential absorptive capacity. Although its path coefficient loading was acceptable, it was not significant for realised absorptive capacity.

5 Conclusion

In completing this study, several findings were derived which validated the influence of mobile learning under BYOD practices on the student's absorptive capacity. It was determined that the main features of mobile learning are authenticity, collaboration and personalisation which were imperative in the BYOD learning environment. It was also found that the personality shown in mobile learning can influence the potential absorptive capacity and realized absorptive capacity to gain knowledge while the social process involved in collaboration dimension under BYOD can enhance student's learning experience (Lee and Tsai 2011). This means that there has to be a certain degree of social collaboration for mobile learning to be effective.

The results derived from the authenticity dimension were however mixed. It was found that the potential absorptive capacity was influenced by authenticity but could only partly influence the realised absorptive capacity. This means that features in authentic learning will only be useful in the knowledge acquisition and assimilation for the students. The findings are consistent with the notion that mobile technology cannot assure knowledge being fully absorbed by students (Motiwalla 2007). It should be noted that it can be challenging for students to exploit the knowledge gained in an actual business scenario (Radinsky et al. 2001).

In terms of importance, it was found that the personalisation dimension tested was more critical than the collaboration dimension. Adopting the BYOD concept with the support of digital and mobile devices allowed students to learn anywhere and anytime in the way they see fit (Zurita and Nussbaum 2004). Furthermore, they could learn at their own pace and decide what they want to learn and from whom they wish to learn from, thereby making learning more personal. Technology alone

is not sufficient without one's extra effort to blend all learning materials gathered to meet their own learning objectives.

Limitations: Completing this study met with several limitations. One of the significant limitations was that the scope of study was constrained to the Malaysian education scenario. As such, the findings might not be applicable to learning environments in other countries or locations. However, this provided the platform to examine how this study can be extended to other countries.

Future Direction: Future studies of this study can be extended to examine if the enhanced student's absorptive capacity via mobile learning can have impact on the student's academic performance. Besides that, the interactive nature of mobile learning can be linked to student's initiative to be more innovative particularly in their learning process using the BYOD concept.

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The Impact of Digital Literacy Training on Learning Performance of University Students in a Problem-Based Learning Environment

Loh Kah Heng

Abstract Problem-based learning (PBL) has emerged as an innovative educational approach, and it is increasingly gaining its prominence in the higher education in Malaysia. Past research shows that digital literacy competence has strong and positive influence on academics' motivation and academic productivity. However, there is little research carried out to examine the impact of digital literacy skills on the improvement of learning performance of university students in PBL environment. This study aims to examine the influence of digital literacy skills training on the learning performance of university students in the Physics course conducted in PBL approach. This study utilises Solomon four-group design by setting up two experimental groups and two control groups for the experiment. Seventy eight students in the School of Liberal Arts and Science of Taylor's University in Malaysia participated in this study. The study investigated whether digital literacy skills training would improve the learning performance of the university students and if a cause and effect relationship existed between digital literacy skills training and learning performance. The independent variable of this study was the digital literacy skills training. The dependent variables were the learning performance scores which constitute two subjective measures, namely, learning satisfaction and learning attitude, and one objective measure, the learning score. A between-group factorial ANOVA showed that the treatment of digital literacy did have an impact on learning performance. The findings inferred that there was a cause and effect relationship (causation) between digital literacy skills training and improvement in learning performance of university students in PBL environment. The philosophy of learning through problem-solving process in PBL is conceptually parallel to digital literacy competency standards for higher education. This study confirmed that digital literacy skills training may help raise the learning performance of university students learning under PBL environment.

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1 Introduction

1.1 Problem-Based Learning

A paradigm shift in teaching and learning has been observed in most of the universities, university colleges and colleges in Malaysia since the new millennium. Most universities started to change from traditional teaching approach to a problem-based learning (PBL) approach. In fact, PBL has emerged 30 years ago in light of the problems and shortcomings of traditional educational approaches. The successful implementation of PBL in the Medical and Dental Faculties of the University of Malaya was one of the significant examples (Mohd Arriffin et al. 2004). Finkle and Torp (1995) described PBL as a curriculum development and instructional system that simultaneously develops both problem-solving strategies and disciplinary knowledge bases and skills by placing students in the active role of problem solvers confronted with an ill-structured problem that mirrors real-world problems. PBL has attributed an engaging and motivating way for the learners to learn as they work with problems that are challenging and perceived to be appropriately useful to their future career. A problem-based learning (PBL) environment has an important role to play in developing a student's ability to learn how to learn. It is a student-centred environment which organises the curriculum around an ill-structured, "real-world" problems or scenarios, purported to empower learners by encouraging them to take a deep approach to their own learning. This approach enables students to become more confident and self-directed in their learning. Harvey (2004) described empowerment as the development of knowledge, skills and abilities in the student to enable them to control and develop their own learning. Digital literacy provides a means of individual empowerment within today's information society (ALA 1998). This shift to independent learning has made digital literacy skills critical to students' survival and success (Winship 1995; Coombs and Houghton 1995; Wales and Harmon 1998). It has been documented that the role of current digital literacy actually forms the basis for lifelong learning (ACRL Task force 2000).

1.2 Digital Literacy

The word literacy refers to the ability to read and write. However, in order to gain successful in today's digital world, literacy goes far beyond this. The word digitally literate has reflected the change in how information is processed, delivered and received in today's highly digital environment.

There exist a variety of definitions of digital literacy. Among these definitions, the American Library Association has a broad definition with an emphasis on

information literacy: "*Digital Literacy is the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills"*.

The University Library of The University of Illinois defines digital literacy as *the ability to use digital technology, communication tools or networks to locate, evaluate, use and create information.* A person's ability to perform tasks effectively in a digital environment refers to the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers. Digital literacy includes the ability to read and interpret media, to reproduce data and images through digital manipulation and to evaluate and apply new knowledge gained from digital environments (from http://digitalliteracy.us/).

Minnesota's Network for Enterprise Telecommunications defines digital literacy as follows: under the digital literacy umbrella are numerous interrelated skills that range from basic awareness and training to foster informed citizens and to build consumer and user confidence, to a highly sophisticated and more complex creative and critical literacies and outcomes. Given the constantly evolving nature of technology, acquisition of digital literacy skills represents a process of lifelong learning.

Digital literacy has been attributed as one of the Taylor's University Graduate Capabilities (TGC). Under the umbrella of TGC, digital literacy is defined as *the effective use of Information and Communications Technology (ICT) and related technologies.* It is categorised as a soft skill that will raise the employability of the graduates.

The existence of a variety of definitions of digital literacy has reflected the great increases in information that can be conveniently and quickly accessed. This will facilitate the collaboration among learners and sharing of knowledge which leads to individual empowerment and lifelong learning in the PBL environment.

2 Literature Review

Research has shown that digital literacy inclusion has a positive impact on the academic success. Amiri (2009) carried out a research on "The effects of information and communication technology on at risk children of low economic status: *Make It-Take It After-School Case Study"*. The findings of the research indicate a direct increase in academic performance and participation in learning processes by students that participated in the Make-It-Take-It After-School Program. In 2006, Jackson carried out a study, "Does Home Internet Use Influence the Academic Performance of Low-Income Children" (Jackson et al. 2006). In his study, he found that there was a direct correlation between home Internet use and standardised test scores. Children who increased their home Internet use were reported to have higher standardised test scores. Jackson concluded that home Internet use can enhance children's academic performance and further mentions that children using the Internet require some degree of reading.

The Telecommunication for Learning Project which was initiated in 1990 (Project TELL 1990–1997) has reported an improvement in educational outcome of children by participating in active and community learning as a starting point to further identify external factors that, in conjunction with computer use, engage the student and thus contribute to improved academic performance. The key assumption in the project was that children will engage in active learning as they are given access to digital information. This type of instruction distinguishes itself from other teaching methods in two ways: firstly, the process to acquire knowledge is learner driven and, secondly, the learner learns by doing. The student will seek information that is immediately relevant to them and then apply it to additional learning experiences outside of the direct computer environment. Supporters of active learning believe that students who actively engage with the digital material are more likely to recall information later and will be able to use it in different contexts. The McCarthy and Anderson (2000) report discusses two studies that compared traditional teaching methods and active learning. The report reflected higher standardised test scores from the students who were involved in active learning than from the students exposed to traditional teaching methods.

Rankin (1999) articulated that digital literacy is essential to the learning process, and problem-solving process in PBL parallel to digital literacy competency standards is set for higher education. Research showed that shifting to independent learning in PBL has made digital literacy skills critical to students' survival and success (Wales and Harmon 1998). PBL entailed an increased use of libraries and wide variety of digital sources (Limberg 1999). Wurman (2001) pointed out that without digital literacy skills, people are condemned to lack of information, dependence upon others for access to knowledge and information and even to an acute level of information anxiety.

In PBL research community, researchers recognise the importance of digital literacy skills to the successful implementation of PBL (Breen and Fallon 2005), but little research has been done. There is recognition of the important concept of student empowerment, and digital literacy is essential in providing a means of individual empowerment. However this notion has been little explored in the general academic literatures or with reference to PBL environment in higher education more specifically. The findings of this study showed that digital literacy skills training has impacted learning performance which serves as a measure of academic outcomes directly or indirectly in PBL environment.

3 Problem Statement

PBL is a pedagogy approach which empowers students by encouraging them to take a deep approach to learning and to become more confident and self-directed in their learning (Spronken-Smith 2006). PBL educators recognise that university students in PBL environments have the ability to learn how to learn in order to prepare themselves for their future professions (Dunlap 2005). They perceived that students are already digitally literate and know how to do everything as they have smartphones

and everyone has access to the Internet. PBL educators may have overestimated the digital literacy skills of university students. They are not aware that not all students have access to smartphones or the Internet. In addition, students do not always make good choices when using these devices. Moreover, the media is saturated with stories of student cyberbullying, engaging in unsafe behaviour online, disregarding their privacy or violating the privacy of others. While there is valuable information on the Internet, there is also a lot of false information. They have omitted the importance of digital literacy skills which enable students to become discerning users of information on the Internet. Overconfidence of the information technology skills as perceived by university students themselves and negligence of PBL educator in embedding digital literacy skills training in PBL will limit students' ability to successfully participate in PBL so as to explore their full potential in promoting higher-order cognitive skills such as analysis, cooperation, creating, etc. Failing to provide proper digital literacy skills training will limit university students' confidence in information seeking and searching, which will in turn demoralise their learning satisfaction and attitude and eventually limit their learning performance and affect their success and survival in PBL environment.

4 The Purpose of the Study

The purpose of this study is to provide findings on the impact of digital literacy treatment on learning performance in the PBL environment.

The primary null hypothesis of this study states that:

$H_{o1:}$ digital literacy skills treatment has no statistically significant impact on learning performance of university students in a problem-based learning environment.

This primary null hypothesis has led to the three subsidiary null hypotheses, stated as shown:

$H_{o1a:}$ digital literacy training has no statistically significant impact on learning satisfaction of university students in a problem-based learning environment.

$H_{o1b:}$ digital literacy skills treatment has no statistically significant impact on learning attitude of university students in a problem-based learning environment.

$H_{o1c:}$ digital literacy skills treatment has no statistically significant impact on learning scores of university students in a problem-based learning environment.

5 Methodology

5.1 The Sample

A total of 78 undergraduate students who registered the in the Fall 2013 Physics course in the American Degree Program (ADP) of the School of Liberal Arts and Science (SLAS) at Taylor's University in Malaysia participated in this study. The

list of these students was obtained from the Academic Service of SLAS at Taylor's University. These participants were randomly assigned to four groups, namely, E_1, E_2, C_1 and C_2 during the experiment. All these groups were comparative enough in terms of number and resources. Moreover, the pretest analysis showed no significant difference in the dependent measures.

5.2 Research Design

This study utilised Solomon four-group quasi-experimental design (Solomon 1949) by setting up two experimental groups and two control groups for the experiment. The design is rigorous and robust enough to eliminate variations that might arise because of experiences and contaminate the validity of the study (Koul 1992; Kothari 2003). Participants were randomly assigned to experimental groups and control groups through the process elaborated below: each of the 78 participants will write his/her name on an identical sticker, fold the sticker along the middle line and put it into a hat. Four students were nominated as representatives to draw the stickers from the hat in turns. The first representative will draw a sticker from the hat and stick it on the list of E_1 group, the second representative will draw another sticker and stick it on the list of C_1 group, the third representative will draw a sticker and stick it on the list of E_2 group, and the fourth representative will draw a sticker and stick it on the list of C_2 group. This process was repeated until all the stickers have been drawn to create four probabilistically equal groups in order to increase the internal validity of the study.

A carefully crafted ill-structured problem that triggers the learning activity was given to all participants, allocating 20 min for them to study through the problem. One experimental group and one control group (E_1 and C_1) were given 20 min to fill up the pretest questionnaire which measures their learning satisfaction after reading the PBL problem. The other two groups were subdivided into smaller groups of five members before the PBL activities. The pretest instrument was a questionnaire consisting of ten items of learning satisfaction. The experimental groups were then attending a 2-h information literacy skills training conducted by the facilitator in collaboration with a librarian before carrying out PBL activities and information-seeking activity.

The control groups (C_1 and C_2) began the normal process of PBL activities and information-seeking activity. During the PBL process, each subgroup of learners will perform the following activities:

1. State the problem statement.
2. Determine what they know in the problem at hand from their existing knowledge.
3. The knowledge gap (what they do not know).
4. Perform information seeking and searching from credible and authoritative resources.

Table 1 Solomon four-group design

Group	Pretest	Treatment	Posttest
1. Experimental (E_1) R	O_1	X	O_2
2. Control (C_1) R	O_3		O_4
3. Experimental (E_2) R		X	O_5
4. Control (C_2) R			O_6

X: treatment of digital literacy skills training
O_1, O_3: measurement of dependent variables before digital literacy skills training
O_2, O_4, O_5 and O_6: measurement of dependent variables after performing the learning task

5. Discuss, synthesise, integrate and compile information together to reconstruct knowledge.
6. Fill the gap of knowledge and propose the solution to the problem.
7. Finally each subgroup will have to present their proposal concurrently at 5:00 pm.

The students must be able to use their digital devices to record their presentation in a VCD in audio and video format. After the presentation, all participants were posttested on their learning satisfaction about the learning task at the end of the PBL process after they submitted their proposal.

The setup of the Solomon our-group design in this research is shown in Table 1.

The reasons of using Solomon four-group design in this study were:

1. Even though non-random sampling was used to draw the sample, a quasi-experimental study was still possible with the purposive sampling. This purposive sample can be randomly assigned to two experimental groups and two control groups.
2. The ability to control for instrument reactivity. Instrument reactivity refers to situation where pretest cues subjects about the treatment and enables them to guess the expectation. In Solomon-four group design, half of the participants from both treatment group and control group were pretested, while the other half were denied. Thus, it was able to control and test for instrument reactivity.
3. Ability to assess the presence of pretest sensitisation.
4. Allowing more confidence in inferring causal relationships as it has higher degree of internal validity.
5. Extraneous temporal effect is avoided as the treatment for the two experimental groups occurs at the same time, with the collaboration of facilitator and librarian.
6. Most of the threats to internal validity were eliminated.

5.3 Treatment

The independent variable of this study was the treatment which aimed to improve the learning performance of the university students by raising their digital literacy skills. The treatment was a 2-h digital literacy skills training programme conducted by the facilitator in collaboration with librarian in physics-related area in two

separate phases. The first phase was a 40-min lecture of digital literacy knowledge conducted by the facilitator, while the second phase was 80 min hands-on digital literacy skills training session conducted by a librarian in the library training room. The contents of the lecture include explanation and description of the use of some software in the research and the way to operate the digital devices in the digital environment such as in the X-Space classroom effectively. This will involve some complex skills such as cognitive (thinking skills), affective (emotional) and physical (psychomotor skills), as well as sociological that users need to have in order to use digital environments effectively. The lecture also includes a discussion of the five standards of information literacy for higher education, the importance of these standards and how to relate and apply the five standards as they participated in PBL, such as how to:

1. Determine the nature and extent of the information needed.
2. Access needed information effectively and efficiently.
3. Evaluate information and its sources critically and incorporate selected information into his or her knowledge base and value system.
4. Use information effectively to accomplish a specific purpose, individually or as a member of a group.
5. Understand many of the economic, legal and social issues surrounding the use of information and access and use information ethically and legally.

The librarian conducted a "mini-PBL" session in the second phase by giving some learning tasks related to digital literacy skills:

1. Photo-visual skills ("reading" instructions from graphical displays)
2. Reproduction skills (utilising digital reproduction to create new, meaningful materials from preexisting ones)
3. Branching skills (constructing knowledge from non-linear, hypertextual navigation) and information skills (evaluating the quality and validity of information)
4. Socio-emotional skills (understanding the "rules" that prevail in cyberspace and applying this understanding in online cyberspace communication)

These tasks involve the elements of digital literacy skills outlined by Yoram Eshet alkali (2004) which consists of complex skills such as cognitive, motoric, sociological and emotional that users need to have in order to use digital environments effectively.

A summary of the four groups with and without pretest given as well as with and without treatment given is tabulated in Table 2.

Table 2 A summary of the four groups of participants during the experiment

Treatment condition / Pretest condition	DLS training	No DLS training
Pretest	E_1	C_1
No pretest	E_2	C_2

Group E_1: experimental group, with (digital literacy skill) DLS training and pretest
Group C_1: control group, no DLS training but with pretest
Group E_2: experimental group, with DLS training but no pretest
Group C_2: control group, no DLS training and no pretest

5.4 *Instruments*

The independent variable of this study was the treatment of digital literacy skills treatment. The experimental groups were trained in a 2-h digital literacy skills programme by the facilitator in collaboration with the librarian. The dependent variables were the learning performance scores on the self-reporting and numerically measurable questionnaire measured in 5-point Likert scale for subjective measure of learning performance which constitutes learning satisfaction and learning attitude, respectively. The questionnaire was administered in a pretest and posttest format to one experimental and one control group and posttest only for others. By precluding the other two groups from pretesting allowed the researcher to determine if the actual act of pretesting influenced the results. If the difference between the posttest results of E_2 and C_2 was different from the E_1 and C_1, then the researcher can assume that the pretest has had some effect upon the results. The questionnaire was used to ascertain the cause and effect relationship between digital literacy skills training and learning performance. Learning performance was expressed as a function of learning satisfaction, learning attitude and learning scores as shown in Fig. 1.

Learning satisfaction was measured using ten items of self-report measure rated on a scale varying from one being "strongly disagree" to five being "strongly agree" on the learner's satisfaction adapted from the usefulness of the instrument developed and tested by Davis (1989). Learning attitude was measured using an eight-item instrument to evaluate student's attitude by the facilitator during the whole PBL activities inclusive of the assessment for the report presentation of the learning task

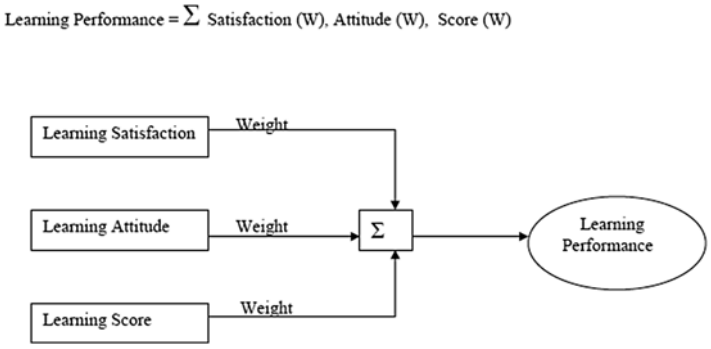

Fig. 1 Expression of learning performance (Loh 2010, p. 35)

on a scale varying from one being "unsatisfactory" to five being "exceptionally satisfactory". Learning score was the assessment on a test sheet which consists of 15 multiple-choice questions designed for the topics on course unit conducted in PBL, together with the marks assigned to the report of the solution of PBL learning task.

6 Results and Discussion

6.1 Testing of Subsidiary Hypotheses

6.1.1 Digital Literacy Skills Training and Learning Satisfaction

Learning satisfaction score was computed as total scores of the ten items of learning satisfaction. The posttest learning satisfaction scores of the four groups were compared and analysed using 2 (pretest/no pretest) × 2 (treatment/no treatment) between-group factorial ANOVA. Table 3 shows the results of this analysis. There was no significant interaction ($F_{1,74} = 1.855$, $p = 0.177$) between two main effects. It can be concluded that no evidence of pretest sensitisation was present. An investigation on treatment effect of posttest scores ($F_{1,74} = 3.011$, $p = 0.087$) indicated that no statistically significant result was obtained. An ANCOVA with pretest scores used as covariant was performed to determine the effect of treatment on posttest scores of groups E_1 and C_1.

The result from ANCOVA ($F_{1, 37} = 6.682$, $p = 0.014$) indicated that a statistically significant result was obtained. This indicated that the treatment has an effect on learning satisfaction regardless of the presence or absence of pretest. Thus, no further analysis was needed, and the null hypothesis H_{o1a} was thus rejected in favour of its alternative hypothesis. It follows that digital literacy skills treatment has a statistically significant impact on learning satisfaction of university students in a problem-based learning environment (Table 4).

6.1.2 Digital Literacy Skills Training and Learning Attitude

Learning attitude was computed as total scores of the eight items of learning attitude. Since there was no pretest administered for the learning attitude, one-way ANOVA was conducted on learning attitude in all four groups of subjects. ANOVA results showed that there were at least two groups of subjects showed significant difference in the mean scores of learning attitude, with the resulting formula $F(3, 74) = 15.882$, $p = 0.00$. A further examination of the Tukey post hoc test indicated that subjects in experimental groups showed higher scores in learning attitude than subjects in control groups, while there was no significant difference in learning attitude scores of subjects between control groups ($p = 0.889$) as well as subjects between experiment groups ($p = 0.970$), as shown in Table 5. Hence, hypothesis H_{o1b} was rejected in favour of its alternative hypothesis. It follows that digital literacy

Table 3 Factorial ANOVA on learning satisfaction posttest scores of all four groups

Dependent variable: learning satisfaction for posttest					
Experimental group	Pretest identifier	Mean	Std. deviation	N	
Experimental group	Pretest	41.6500	2.3232	20	
	No pretest	39.2632	2.9029	19	
	Total	40.4872	2.8550	39	
Control group	Pretest	39.0526	3.5351	19	
	No pretest	38.9500	5.3062	20	
	Total	39.0000	4.4721	39	
Total	Pretest	40.3846	3.2169	39	
	No pretest	39.1026	4.2538	39	
	Total	39.7436	3.8017	78	
Dependent variable: learning satisfaction for posttest					
Source	Type III sum of squares	df	Mean square	F	Sig
Corrected model	98.740[a]	3	32.913	2.402	0.074
Intercept	123,033.419	1	123,033.419	8,977.605	0.000
Treatment	41.270	1	41.270	3.011	0.087
Pretest	30.193	1	30.193	2.203	0.142
Treatment*					
Pretest	25.419	1	25.419	1.855	0.177
Error	1,014.132	74	13.704		
Total	124,318.000	78			
Corrected total	1,112.872	77			

[a]R squared = 0.089 (adjusted R squared = 0.052)
*indicates treatment has an effect on posttest scores

Table 4 ANCOVA on learning satisfaction for groups E_1 and C_1

Dependent variables	Source	MS	df	F	P
Learning satisfaction	Treatment	58.14	1	6.68	0.014
	Error	8.70	36		

skills treatment has a statistically significant impact on learning attitude of university students in a problem-based learning environment.

6.1.3 Digital Literacy Skills Training and Learning Score

Learning score of the students was derived from the mark assigned to each student based on the sum of scores in multiple-choice-question test on the topics covered in PBL and the solution of the learning task reported. There was no pretest done for learning score; a one-way ANOVA was the appropriate analysis performed on learning scores in all groups of subjects. Results from ANOVA revealed that there were at least two groups of subjects that showed significant difference in the mean of learning score, with the resulting formula $F(3, 74) = 4.788$, $p = 0.004$. A further

Table 5 One-way ANOVA for learning attitude posttest scores

ANOVA					
Learning attitude					
	Sum of squares	df	Mean square	F	Sig
Between groups	163.280	3	54.427	15.882	0.000
Within groups	253.592	74	3.427		
Total	416.872	77			
Learning attitude					
Tukey HSD[a,b]					
		Subset for alpha = 0.05			
Group identifier	N	1	2		
Control group with posttest only	20	28.1000			
Control group with pretest and posttest	19	28.5263			
Experimental group with prettest and posttest	20		31.0500		
Experimental group with posttest only	19		31.3158		
Sig		0.889	0.970		

Means for groups in homogeneous subsets are displayed

[a]Uses harmonic mean sample size = 19.487

[b]The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

examination of Tukey post hoc test indicated that subjects in experimental groups showed higher learning scores than subjects in the control groups, while there was no significant difference in learning scores of subjects between control groups ($p = 0.778$) as well as subjects between experiment groups ($p = 0.073$), as shown in Table 6. Hence, hypothesis H_{o1c} was rejected in favour of its alternative hypothesis. It follows that digital literacy skills treatment has a statistically significant impact on learning scores of university students in a problem-based learning environment.

6.2 Testing of Primary Hypothesis

6.2.1 Digital Literacy Skills Training and Learning Performance

Since all the subsidiary null hypotheses were rejected in favour of alternative hypotheses, it was reasonable to predict that the digital literacy skills training has an impact on learning performance of university students.

Table 6 One-way ANOVA for learning score

ANOVA					
Learning score					
	Sum of squares	df	Mean square	F	Sig
Between groups	817.643	3	272.548	4.788	0.004
Within groups	4,212.011	74	56.919		
Total	5,029.654	77			
Learning score					
Tukey HSD[a,b]					
		Subset for alpha = 0.05			
Group identifier	N	1	2		
Control group with pretest and posttest	19	77.1053			
Control group with posttest only	20	79.4000	79.4000		
Experimental group with pretest and posttest	20		83.5000		
Experimental group with posttest only	19		85.3684		
Sig		0.778	0.073		

Means for groups in homogeneous subsets are displayed.
[a]Uses harmonic mean sample size = 19.487
[b]The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed

A one-way ANOVA was employed to further analyse the learning performance of the four groups of students. The results were shown in Table 7. A one-way ANOVA analysis showed that there were at least two groups of subjects that showed significant difference in the mean score of learning performance, with the resulting formula $F(3, 74) = 8.227$, $p = 0.000$. A further examination of the Tukey post hoc test indicated that subjects in experimental groups showed higher scores in learning performance than subjects in control groups, while there was no significant difference in learning scores of subjects between control groups ($p = 0.895$) as well as subjects between experiment groups ($p = 0.855$), as shown in Table 7. Hence, hypothesis H_{o1} was rejected in favour of it alternative hypothesis. Statistical analysis revealed that there was evidence suggesting that digital literacy skills treatment has statistically significant impacted learning performance of university students in PBL environment.

A 2 (pretest/no pretest) × 2 (treatment/no treatment) between-group factorial ANOVA was also performed on learning performance posttest scores of all four groups. Table 8 shows the results of this analysis. From the results in Table 8, it was evident that there was no significant interaction ($F_{1,74} = 0.004$, $p = 0.947$) between

Table 7 Results of one-way ANOVA for learning performance

ANOVA					
Learning performance					
	Sum of squares	df	Mean square	F	Sig
Between groups	1,670.771	3	556.924	8.227	0.000
Within groups	5,009.201	74	67.692		
Total	6,679.972	77			
Homogeneous subsets					
Learning performance					
			Subset for alpha = 0.05		
Group identifier		*N*	1	2	
Tukey HSD[a,b]	Control group with pretest and posttest	19	109.5368		
	Control group with posttest only	20	111.3950		
	Experimental group with pretest and posttest	20		118.5050	
	Experimental group with posttest only	19		120.6105	
	Sig	0.895	0.855		

Means for groups in homogeneous subsets are displayed.
[a]Uses harmonic mean sample size = 19.487
[b]The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

main effects. It can be concluded that no pretest sensitisation was present. An investigation on treatment effect of posttest scores ($F_{1,74} = 23.797$, $p = 0.00$) revealed a statistically significant result. This implied that treatment had an effect which existed without any prerequisite. The digital literacy skills training thus significantly improved learning performance of university students despite the presence of pretest. Thus, as anticipated, H_{o1} was rejected in favour of its alternative hypothesis which was consistent with the results obtained from the one-way ANOVA.

The Solomon four-group design used in this research furnished all the conditions for cause and effect study. Firstly, this experimental study established a relationship. Secondly, a proper time order was observed, whereby the independent variable was manipulated and then the outcome was observed. Finally, it ruled out alternative explanations because random assignment equates the groups on all extraneous variables at the start of the experiment. Thus, the findings inferred that there was a cause and effect relationship (causation) between digital literacy skills training and the two dependent variables and that there was a cause and effect relationship (causation) between digital literacy skills training and learning performance of university students in PBL environment.

Table 8 Factorial ANOVA on learning performance posttest scores of all four groups

Descriptive statistics				
Dependent variable: sum of PBL learning satisfaction, learning attitude and score				
Experimental group	Pretest identifier	Mean	Std. deviation	N
Experimental group	Pretest	118.5050	7.4568	20
	No pretest	120.6105	7.3995	19
	Total	119.5308	7.4077	39
Control group	Pretest	109.5368	9.4244	19
	No pretest	111.3950	8.4867	20
	Total	110.4897	8.8865	39
Total	Pretest	114.1359	9.5130	39
	No pretest	115.8846	9.1500	39
	Total	115.0103	9.3141	78

Tests of between-subject effects					
Dependent variable: sum of PBL learning satisfaction, learning attitude and score					
Source	Type III sum of squares	df	Mean square	F	Sig
Corrected model	1,670.771[a]	3	556.924	8.227	0.000
Intercept	1,031,084.113	1	1,031,084.113	15,232.015	0.000
Treatment	1,610.841	1	1,610.841	23.797	0.000
Pretest	76.540	1	76.540	1.131	0.291
Treatment[*]					
Pretest	0.298	1	0.298	0.004	0.947
Error	5,009.201	74	67.692		
Total	1,038,413.980	78			
Corrected total	6,679.972	77			

[a]R squared = 0.250 (adjusted R squared = 0.220)

[*]indicates treatment has an effect on posttest scores

7 Conclusion

The findings have demonstrated that digital literacy skills training embedded in PBL environment by the facilitator in collaboration of the librarian can be effective in improving students' learning performance. The inferential statistics used has revealed that differences in the mean score of learning performance of students in the treatment group and those in the control groups were statistically significant. The collaboration with librarians to conduct digital literacy skills training is essential in the successful implementation of PBL. Further research is recommended to expand this study to university students from other majors such as business, humanity, laws, and arts or even the postgraduate master or PhD students. Students with different majors and maturity may respond differently to an intervention.

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Holistic Education in a Preparatory High School: An Innovative Program to Prepare Students for the Future

Foo Seng Yong and Li Lin Khoo

Abstract Over the years there has been a reaction from parents and employers toward certain types of schooling which they deem too narrow in nature. Many lament that "traditional schooling" has failed to provide education that empowers individuals to be productive members of society. Education in an Asian context often focuses on developing high-scoring students who perform well in high-stakes tests. This is often to the detriment of other "soft skills" integral in the formation of a well-rounded individual. Thus there is a need to relook at conventional ways of "doing" education. The aim of this paper is to investigate the outcomes of an innovative program that sought to instill in high school students the skills necessary in their preparation for work, which is a key notion of holistic education. The essence of this innovation lies in pairing preuniversity and A-level students from a private college with performance coaches on a 1:1 ratio. The purpose of the coach was to implement a strategy to develop a variety of skills in the student not normally attainable within a classroom setting. The skills ranged from developing personal mission statements to improving time management. After 6 months, questionnaires and interviews were administered to the students ($n=75$) and the results analyzed. Quantitative data from the questionnaires and a thematic analysis of interviews showed that students perceived they had learned the most in the following areas: time management, communication, and problem-solving. In addition, the administrators of the program obtained feedback to improve the program for further implementation. One suggestion was the need to increase contact hours and include more group activities. As a measurement of success, it was found that 93 % of students surveyed would recommend the program to others.

Keywords Innovative holistic education program • Coaching • Qualitative research

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1 Introduction

> *Education is the most powerful weapon that you can use to change the world.* (Nelson Mandela)

A key tenet of holistic education is to prepare an individual for work (Forbes 2003). In order to achieve this, there has been a focus on producing students who perform well in high-stakes tests. This focus is often detrimental to the development of other less tangible "soft skills." Over time, there is an increasing realization that good grades do not necessarily correlate to good employees. According to a recent survey by JobStreet, a Malaysian Internet hiring agency:

> *Every year about 180,000 students graduate from institutions of higher learning. There's always been a gap between employers' expectations of graduates and the quality of graduates produced. Nearly 70 per cent of employers think the level of quality among fresh graduates is only average. They said it's not due to lack of academic qualification, but because of their bad attitudes or poor communication skills shown during interviews and/or at work*. (Digital News Asia 2013)

Education must be able to produce individuals who can meet the expectations of their employers. The addition of nonacademic-related competencies such as resilience, setting of life goals, problem-solving, etc. is necessary to produce well-rounded individuals. This thrust is aligned to Miller's definition (2005) of holistic education that emphasizes the education of the whole person.

One approach to building nonacademic skills in students is the process of life coaching. Life coaching may be defined as:

> Collaborative, solution-focused, results-orientated systematic process, in which the coach facilitates the coachee's life experience, goal attainment and well-being and fosters the self-directed learning and personal growth of the people from normal (i.e. non-clinical) populations. (Green et al. 2007)

Studies have shown that life coaching has the potential to help students build resilience, manage stress (Campbell and Gardner 2005), develop cognitive hardiness, and increase hope (Green et al. 2007). This paper aims to assess an innovative life-coaching program at a preparatory high school in Malaysia.

2 Taylor's College Holistic Education Program

The overarching objective of the Taylor's College Holistic Education Program (hereafter referred to as "the program") is to achieve the core purpose of the college, that is, to "educate the youth of the world to take their productive place as leaders in the global community" (Taylor's College n.d.). The administrators of the program believed that this objective could be achieved by nurturing specific skills within the student. The program categorized these skills within three broad groups – learning skills, life skills, and leadership skills. Learning skills were defined as skills that enabled the student to succeed academically, for example, report writing,

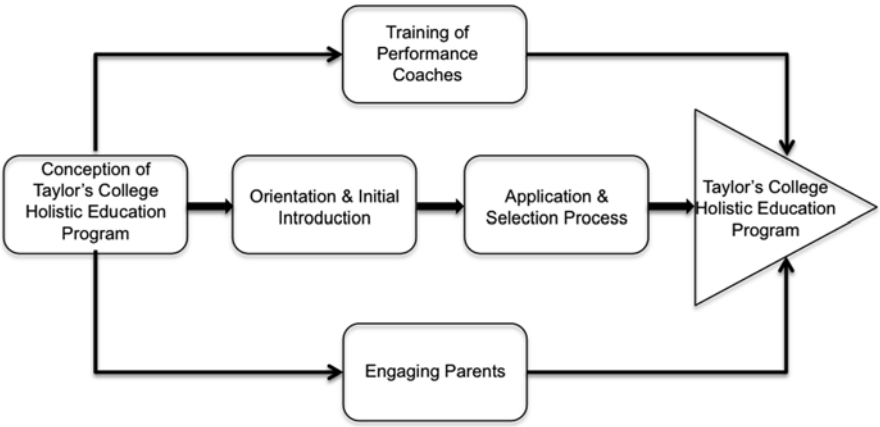

Fig. 1 Overview of Taylor's College Holistic Education Program

note-taking, and exam preparation skills. Life skills were skills that enabled the student to be productive individuals. These included crafting personal mission statements, problem-solving, and time management. As for leadership, skills like cross-cultural communication and team dynamics were deemed important.

The program consisted of six key phases as detailed in Fig. 1.

2.1 Program Context and Structure

The program was administered in Taylor's College, a preparatory high school in Malaysia. This program matched 10 performance coaches (hereafter referred to as "coaches") with 112 students (hereafter referred to as "coachees"). Coaches were either classroom teachers or senior administrators in the school. The number of coachees assigned to the coaches ranged from 1 (for senior administrators), 5 (for coaches with a teaching load), to 25 (for coaches without a teaching load). The coaches were required to meet with each of the coachees individually at least once a fortnight for 30 min to an hour each time for a period of 6 months.

2.2 Performance Coaches

In the program, performance coaches were closely aligned to the life coach model. The performance coach augments a life coach by including a contract that the coachee is obliged to meet. This contract would have been agreed upon prior to the start of the coaching relationship and stipulates academic and personal targets.

Common definitions of coaching often emphasize the equality of the relationship (Rogers 2008). To a certain extent, the relationship between the coach and the coachee in the program was somewhat unequal as coachees were encouraged to consider the guidance of the coach as more than merely good advice.

The training and selection of the coaches were crucial to the success of the program. Coaches were individuals selected from within the organization and possessed the ability to adapt to new challenges, the desire to try new approaches, and an inherent passion for students. All the coaches were teachers and had vast teaching experience. The training of the coaches focused on developing three abilities. They were the ability to self-reflect and take action, the familiarization of specific tools designed to impart life skills, and the gaining of coaching skills. The approach taken during this phase of coach development was to "unfreeze" the existing mindsets of the new coaches and learn a new skill and subsequently "freezing" again (Lewin 1947). The unfreezing process often required an "emotional stir-up" as prescribed by Lewin (1947). This involved a large amount of self-reflection on the part of the coaches regarding their teaching philosophy and practice. It would have been detrimental to the program if the coaches were to apply classroom methodologies (especially of the didactic form) to the coaching relationship.

2.3 The Coachee

The recruitment of students for the position of coachee encompassed two key phases – the introduction phase and the selection phase. The introduction phase was to present the objectives of the program and give candidates an overview, including the time and effort required if they were to participate in the program. The program was presented to a new cohort of 180 students. The coaches facilitated the introduction sessions. This allowed the students to interact with the coaches and experience the coaching process briefly.

Upon completing the introduction, students were given the opportunity to apply for the position of coachee through an online portal. The results from the application process were tabulated and candidates chosen for an interview. The criteria used to determine the suitability of the candidate for the position of coachee were openness to change, the desire to change, and an eagerness to participate in the program. Successful candidates were informed and a formal meeting initiated.

2.4 Engaging Parents

Parents of the coachees were considered key stakeholders in the program. Parents were called by telephone by each of the assigned coaches, and the progress and welfare of the coachee were discussed. During this conversation, feedback was gathered regarding the coachee. Areas for improvement in the coachee were

identified. One formal meeting was arranged in order for parents to meet the coaches personally. Here, parents engaged face to face with their child's respective coach for a more detailed discussion. This meeting also allowed the administration to present the objectives of the program and take questions from parents.

3 Methods

The coachees were required to provide feedback regarding the efficacy of the program at the end of 6 months. An online questionnaire was prepared for this purpose. We collected data by combining 4-point (forced choice) response questions with open-ended questions. For our purposes, a 4-point scale was deemed preferable as there were concerns that some students would tend to agree with statements presented in the questionnaire. Forced choice (4-point) scales may be argued to increase validity and reduce central tendency bias (Baron 1996).

The results were tabulated and quantitative data analyzed using an MS EXCEL spreadsheet to find mean, standard deviation, and percentage values. The open-ended questions were analyzed using a thematic approach. We familiarized ourselves with the data before starting the coding process. Subsequently, the codes were refined and themes generated. These were then reviewed, further refined, and presented in the findings section (below). We also conducted a comparison of the coachees' academic results with a group of students who were not in the program but from the same initial cohort.

4 Findings

The first section of the questionnaire asked coachees ($n = 75$) or students to rate their experience of the program on a scale of 1–4 (1-strongly disagree, 2-disagree, 3-agree, 4-strongly agree). A summary of the findings is shown in Table 1.

Students were asked to choose three skills that they found to be most useful from a total of eight options (structured problem-solving, time management, managing effective meetings, effective communications, decision making, stakeholder management, conflict resolution, and change management). The results of this section are shown in Table 2.

Table 1 Summary of coachees' perspective on the effectiveness of the program

Question	Mean	SD	%>3-Agree
1. The coaching has improved my learning skills	2.9	0.63	79.0
2. The coaching has enhanced my life skills	3.1	0.57	88.2
3. The coaching has developed my character and leadership skills	3.0	0.73	72.3

Table 2 Students' perspective on three useful skills gained

Skill	%
1. Time management	76.3
2. Effective communications	64.5
3. Structured problem-solving	48.7

The thematic analysis of the open-ended questions generated two major themes. The first theme was that the coach was perceived to be valuable in helping the coachee learn new skills. The following statements demonstrate the importance of the coach.

> Well i was having a hard time at the start of my college life and having a person which is my performance coach to talk to was quiet helpful, she gave me good advices and the outcome was good, but mostly she wanted me to do was reflecting, which helped me to think more and not being too emotional. (Coachee)

> My coach had asked me to list the things that distract me during studying. She gave me advices on how I am going to prevent those things from bugging me when I am studying. I am very happy because now I can follow those advices and I can concentrate on my studies better these days. (Coachee)

> When i first entered taylor's college, i had a problem for not having confidence in myself especially when it comes to class test. i was so nervous that my mind went completely blank and so i didnt do well in my tests. but mrs delicia gave me a very good advice that really boosted up my self esteem level. now i know how to control my emotion, now i know what's my aim. now i know how to live a balance life. (Coachee)

> Ms Li Lin enlighten me the importance of efficiency and time management. I never realise how powerful was this tools before I met her. However, lack of discipline in myself made me fail to abide to the rules of the tools. I have to learn more from her. (Coachee)

The data also showed that coachees perceived they had learned new skills through the program.

> I have learned a lot about life skills and corporate management. Hoping to share more ideas and attain feedbacks. (Coachee)

> From this program I have learned to manage my time. I have also gained an insight to systematic problem solving. I now know how to draft out a plan to reach my desired grades, how far I am from it and what I need to do to get there. (Coachee)

> I have learned to be self-motivated as I realise that only I, myself am accountable for my actions. Furthermore, I have gained an idea on how to strategically solve my problems, as well as a more mature way in handling my emotions when things don't go my way. (Coachee)

The second theme to emerge from the data was that the program had helped the coachees gain self-awareness. They learned more about their weaknesses and how they could improve.

> Joining this programme enabled me to understand myself deeper and discover my hidden potential. It also encouraged me to approach and extend my limitation whilst guided me to overcome my inner fear with a systematic skill and proper way, for instance, fish bone etc. I have learnt about the importance of time management in juggling my academic result and meaning of my life. (Coachee)

> I realise that my appearance will not affect my confidence and I just need to be myself. I become more sociable and extrovert for friends, coach and lecturers are always my best company. (Coachee)

> I had listed a few of my weakness and my coach help me to think on how I am going to overcome my weakness, and even until now I am still trying to overcome my weakness. I am going to overcome my weakness little by little. (Coachee)

The closing section of the questionnaire asked students to suggest improvements to the program and whether they would recommend it to their friends. Here, the data suggests that coachees preferred more opportunities to engage in group activities. The statement below illustrates this.

> This programme focuses more on personal development, and individualism, but I personally would appreciate it if a camp or summit can be organized to allow all the participants of this programme to get to know each other, exchange ideas and have fun. Learning from others is an effective way of learning too. (Coachee)

Ninety-three percent of students surveyed said that they would recommend the program to their friends.

Subsequently, a *t*-test was conducted to compare the average examination scores of those in the program ($n=75$) with those not in the program ($n=68$). Those not in the program were from the initial cohort of students who did not sign up for the program after the introduction session. This control group continued with their studies in the college without performance coaches. There was no significant difference between the scores for those in the program ($M=74.7$, SD = 8.9) and the control group ($M=73.2$, SD = 15.2); $p=0.57$. These results suggest that the program did not significantly increase the examination scores of the coachees.

5 Discussion

The high mean scores and percentages in Table 1 implied that from the perspective of the coachees, the program was successful in developing some skills. Most notable were the skills of time management, effective communications, and structured problem-solving (Table 2). The performance coach was crucial in this process. The coachees also found the program worth their while as 93 % would recommend the program to their friends. At this point, the data provided an initial impression to the usefulness of the program. However, in order to generalize the results to the population, further research with larger samples would be necessary. Future research would also have to include empirical measurements on skills attainment by the coachee.

The thematic analysis suggests that students gained a sense of self-awareness. Statements such as "lack of discipline in myself" and "understand myself deeper and discover my hidden potential" illustrate this. These statements suggest the beginnings of self-authorship in the individual. Self-authorship is the internal capacity to define one's belief system, identity, and relationships (Baxter Magolda 2007).

The ability of some coachees to reflect on their lives and their issues as a result of the program demonstrates an internal capacity that by definition would be foundational in the process of gaining self-authorship. These observations agree with the research of Robinson and Gahagan (2010) that posits coaching as a method to develop self-authorship. A more comprehensive study (Hodge et al. 2009) stipulates three tenets to developing self-authorship. Summarizing, they are (1) guiding students, (2) actively engaging students, and (3) creating a vibrant campus learning community. The first two are present in the coaching process of the program. This, together with data from the thematic analysis, suggests that there is potential for the program to help the coachees attain self-authorship.

Implications for future practice would be to include the element of group dynamics in the program. The coachees perceived that the program could have been more effective if given opportunities to network and interact with their peers instead of individual coaching alone. Also further research should be conducted on the effect of coaching on examination results. Current indications from our data show no significant difference ($p = 0.57$). A probable cause for this is the lack of emphasis on specific learning skills correlated with exam results, for example, examination techniques and subject-specific advice. Again, it is difficult to generalize this finding due to the small sample size. Future improvements should include randomly stratified control and experiment groups using larger samples.

6 Summary

This study assesses an innovative program for holistic education in a preparatory high school. It provides preliminary evidence that the program is successful in helping students gain skills to complement their academic achievements and is valuable in beginning self-authorship. This study finds the role of the performance coach invaluable for the transmission of these skills. Further research should include increasing research rigor in obtaining empirical measures of student skills, increasing sample sizes for generalizability, and assessing self-authorship in more depth. The study is unable to correlate whether the core purpose of the college can be achieved through the program, but results indicate that it is definitely a step in the right direction.

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Students' Patterns and Level of Social Interaction in an Online Forum

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Abstract Of late, learning management system is widely used in higher education. One of the most widely used asynchronous communication tools in online courses offered in LMS platform is discussion forum. For blended or hybrid learning courses, online forum can be used to complement face-to-face sessions. In an online forum environment, the students' participation and interaction levels can be measured and analyzed using social network analysis. This analysis includes measuring (1) degree centrality, (2) betweenness centrality, (3) closeness centrality, and (4) density. In this study, a total of 23 postgraduate students currently undertaking a blended learning course offered by a public university in Malaysia were involved, in which an online forum was conducted for 3 weeks as part of the course requirement. The finding indicates that the communication among the students in the forum is quite low as the network density value is 0.11. Also, six students were identified as the leaders of the information, five students were identified as bridging participants, 13 students were identified as risk participants, 13 students were identified as isolated participants, while two students were not involved in the discussion. This study suggests some recommendations to increase the students' engagement in online forum.

Keywords Asynchronous discussion forums • Social network analysis • Engagement • Interaction

1 Introduction

The use of learning management system (LMS) in higher learning is common nowadays. LMS as a learning platform can be used to deliver online learning materials as well as learning activities such as forum, test and quiz, assignment, reflective writing, etc. LMSs are used either for online learning programs or for blended

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learning. In blended learning (also called hybrid learning), LMS can complement face-to-face classroom sessions. Examples of commonly used LMSs include Modular Object-Oriented Dynamic Learning Environment or MOODLE and Blackboard or WebCT.

As one of the main features or activities available in any LMS platform, online forum as an asynchronous communication tool allows for social interaction to take place among its participants including the instructor and students to work together to achieve the learning objectives. Besides, there are many advantages of integrating asynchronous discussion forums in courses. The forum can increase students' achievement (Chan and Chan 2011) and give great impact on learning results (Miyazoe and Anderson 2010). Furthermore, social interactions in communication will contribute to the quality of students' learning experiences (Zheng and Spires 2011).

However, asynchronous forums are still not popular among students (Wise et al. 2012). Even the students' engagement in online forums is still at a low level (Pamela 2010). According to Wise et al. (2012), in order to produce a two-way communication and quality discussion, the participants need to read existing posts before sending own post. There are also students who just read the messages and do not take part or more likely to focus on selected forums only. These are the obstacles faced by the students in engaging themselves in the forum which might affect the quality of the forums. According to Rabbany et al. (2012), in order to completely understand the participation of students in a forum, it is necessary to investigate the students' pattern of interaction, the group's information provider, and the isolated and neglected learners in the group. Thus, there is a need to look at the social level of interaction, the role of the students, and their contribution in asynchronous discussion forums. However, to assess students' engagement in an online forum is a major challenge faced by the instructor.

According to Rabbany et al. (2012), previous studies were focusing only on the analysis of the content and student tasks. Those studies also ignore the level of social interaction. This may be due to the absence of such tools in the LMS used to assert quantities and the relation among participants in the forum (Anna et al. 2012). Thus, instructors had to conduct the analysis manually. Such analysis takes longer to understand and is even less practical (Rabbany et al. 2012). Thus, social network analysis (SNA) is proposed to be used to measure the patterns of social interaction and information exchange that takes place in discussion forums.

Social network analysis (SNA) is a tool that can be used to assess the overall pattern of social interaction and information exchange that takes place in the overall discussion forums (Vercellone-Smith et al. 2012). Also, it enables the user to detect the interactions and relations among network participants, describes the patterns of interaction, and traces the flow of information within a network (Zheng and Spires 2011). In addition, SNA can identify at-risk students in the class (MacFadyen and Dawson 2010). It will also provide visual information such as strong or weak ties in the network, which will lead us to the information about potential high or low achievers in the class. According to Davies and Graff (2005), students who fail tend to usually interact at low levels compared with those who achieve a passing grade. Early identification of their interaction and engagement in an online environment is

important, especially in detecting these "at-risk" students. Thus, this study attempts to analyze the students' engagement and interaction level in asynchronous discussion forums. There are several common variables that can be used to analyze individual behaviors in SNA, including the *centrality* (*degree*, *closeness*, *betweenness*) and *density* (Vercellone-Smith et al. 2012).

According to Burt (1983), *degree centrality* (*in-degree* and *out-degree*) is used to measure the number of student's connections (links) with the other participants. *In-degree centrality* indicates that a participant has received messages from his or her peers. In contrast, *out-degree centrality* indicates that a participant has sent messages to others. A participant is identified as more active in spreading information, opinion, comment, or discussion if the value of *out-degree centrality* is high. It also means that the particular participant is influential in the network and popular. The leader of information is often associated with the high *centrality* (Brass 1992), while the isolated participants are those who may not have contact with peers (McDonald et al. 2005).

The *closeness centrality* is the individual's close position with other individuals in the network (Freeman 1979). The smaller *closeness* value indicates that the information can be easily transferred directly to that participant in the forum. On the other hand, a higher *closeness* value indicates that the information needs to travel through other participants in order to reach a particular participant.

Betweenness centrality refers to the extent a node lies between other nodes in a network (Freeman 1979). Participant with high *betweenness* value is named as bridging participant or mediator. A bridging participant can control the flow of information between students. Node with a high *betweenness* value is regarded as a leader by other participants in the network (Mullen and Salas 1991).

Density is used to indicate students' involvement in the network as a whole. It is a proportion that indicates the number of actual ties present in the group relative to the number of possible ties in the group (Burt 1983). As the *density* value of a network is 100 %, this shows all students communicate to one another. Conversely, if the *density* is 0, it indicates that the network does not have any communication or contact among its participants.

2 Methodology (Participants and Learning Task and Data Extraction and Processing)

All 23 postgraduate students in a master course on educational technology in a public university in Malaysia participated in this study. The course was taught in a blended format in which they had to attend classroom meetings as well as online learning sessions. The students met on Tuesdays for a 2-h class lecture. For the online learning sessions, they were required to participate in a weekly forum session and discuss the topic assigned for the particular week.

Social Networks Adapting Pedagogical Practice (SNAPP) is the SNA analytical tool used in this study. Students' engagement in the online forum sessions was

analyzed based on the frequency of discussions or tasks carried out and recorded in MOODLE. Data of *degree* (*in-degree*, *out-degree*) and *betweenness centrality* were processed by using the SNAPP software. This software was then used to export the data in a VNA format in order to be imported to NetDraw software. VNA is the format used by NetDraw, and it defines nodes and edges/ties and also supports attributes. The output of the NetDraw was used to provide a better understanding and gain social graph layout which is more complex and sophisticated in social networks. In addition, the network *density* and *closeness* data can also be obtained from NetDraw.

The values for *degree*, *closeness*, *betweenness*, and *density* are split into higher quartile and lower quartile. Students' engagement is considered high (active) when tasks (responses/post) in forum are identified on the third quartile (upper quartile); the engagement is considered low (passive) if they are found in the first quartile (lower quartile) (Lipponen et al. 2001). A participant is considered as a bridging participant if the *betweenness* value is at the top quartile in the group. A participant is considered as "the leader of information" if the *in-degree* is rated in the third quartile in the group. Also, a participant is considered at risk if *in-degree* or *out-degree* is in the lower quartile in the forum, while zero *in-degree* indicates isolated participants.

3 Findings

The social network analysis (Fig. 1) shows the students' interaction patterns that occur in the asynchronous discussion forums. The arrows directing the interaction indicate either a one-way or two-way communication. This forum involved 23 students and one instructor; however, the instructor's data was not used for data

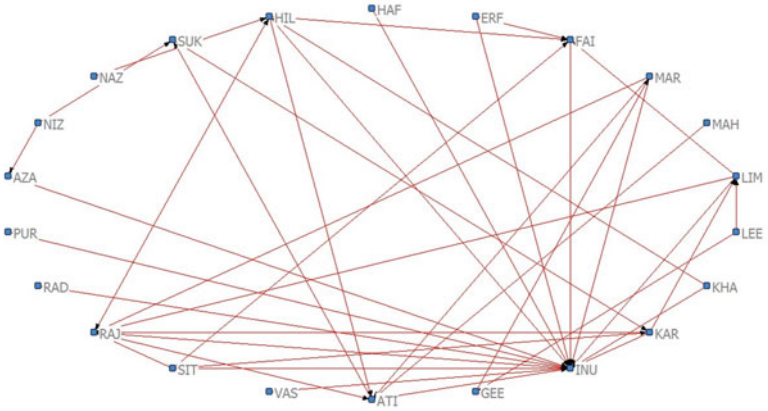

Fig. 1 Patterns of social interaction among the participants

analysis. The thickness of the lines represents the number of interaction that occurs among the participants. The line with an arrow shows the interaction direction as one-way communication. The line with two arrows (solid line) shows the reciprocal interaction of the two participants that commented on posts made by each other. Based on this figure, the forum contains only one reciprocal interaction, that is, between HIL and RAJ, while others are one-way interaction.

In addition, each participant's interaction patterns indicating their communication links in terms of *degree*, *closeness*, *betweenness*, and *density* values were also measured. Table 1 summarizes the engagement for each participant.

3.1 Degree Centrality

Table 2 shows the range of *out-degree* and *in-degree* value is between zero and six (except for the course coordinator). HIL has the highest *out-degree* at six, while FAI, KAR, and SIT each has four. Two participants, SOR and KOM, were identified as having the lowest *degree* of zero. RAJ is reported to have the highest *in-degree* value (six), while FAI and ATI have five and four, respectively. This is followed by HIL, LIM, and SUK who scored an *in-degree* value of three. Moreover, it was found that 13 out of 23 participants had zero *in-degree*, which means that no one responded to their posts. In addition, the *degree* of interaction of four exists between FAI and INU (course coordinator). Meanwhile, there are two *degrees* of interaction between five pairs of participants, namely, AZA-INU, HAF-INU, FAI-HIL, HIL-RAJ, and KAR-LIM. Other participants were reported to have only one *degree* of interaction. Also, KOM and SOR have zero *degree* of interaction – indicating that no interaction exists between them and the other participants in the network.

The analysis also indicates 13 at-risk students because they tend to be low performers (low level of interaction) in the online forum session. In the analysis, they indicated between zero and two *degrees* of interaction. Participants with two *degrees* of interaction are KHA, LEE, NIZ, HAF, GEE, and ERF. Participants with one *degree* of interaction are MAH, NAZ, PUR, RAD, and VAS, while SOR and KOM showed a zero *degree* of interaction.

Six participants have been identified as the information leaders as they received feedback or responses from the other participants. In other words, these leaders are participants who have a high *in-degree* value, and in this analysis, their *in-degree* value falls in the third quartile. Based on Table 1, the leaders of information are RAJ (six), followed by FAI (five), ATI (four), LIM (three), HIL (three), and SUK (three).

The participants who did not engage in discussions or did not receive any feedback from their peers are referred as isolated students. Based on the analysis, 13 students were identified as isolated participants. Some of them were also identified as at-risk students, and they are SIT, KHA, LEE, NIZ, HAF, ERF, MAH, NAZ, PUR, RAD, and VAS. They posted their messages in the forum, but they did not receive any feedback. Two participants – KOM and SOR – did not engage in the discussions.

Table 1 Student interaction in asynchronous discussion forums in matrix

Name	[a]INU	HIL	FAI	KAR	SIT	RAJ	MAR	LIM	ERF	ATI	KHA	LEE	SUK	NIZ	AZA	HAF	NAZ	MAH	VAS	RAD	GEE	PUR	SOR	KOM	Out-degree *(s)*
[a]INU																									0
HIL	1		2			2				1															6
FAI	4																								4
KAR	1					1		2																	4
SIT	1		1	1		1																			4
RAJ	1	1								1															3
MAR	1					1				1															3
LIM	1		1			1																			3
ERF	1		1																						2
ATI	1												1												2
KHA	1	1																							2
LEE								1													1				2
SUK				1									1												2
NIZ													1		1										2
AZA	2																								2
HAF	2																								2
NAZ		1																							1
MAH										1															1
VAS	1																								1
RAD	1																								1
GEE							1																		1
PUR	1																								1
SOR																									0
KOM																									0
In-degree (s)	20	3	5	2	0	6	1	3	0	4	0	0	3	0	1	0	0	0	0	0	1	0	0	0	49

[a]Course coordinator

3.2 Closeness Centrality

The smaller *closeness* value indicates the closer a participant with others in the network. Referring to Table 2, the *closeness* value is between 36 and 59. RAJ has the lowest *closeness* value of 36 followed by ATI (37), which indicates that they are the closest participants to the others in the discussion. Two participants, NIZ and NAZ, indicated the highest *closeness* value of 59 which means they are the farthest in terms of engagement from their peers. In addition, GEE, LEE, and MAH obtained the *closeness* value of 57.

Table 2 Value of degrees (in-degree, out-degree), closeness centrality, and betweenness centrality

Num	Students' name	Num of post	*Degree(s)*	*In-degree(s)*	*Out-degree(s)*	*Closeness centrality*	*Betweenness centrality*
[a]	INU	1	20	20	0	27	128
1	HIL	6	9	3	6	39	24
2	FAI	4	9	5	4	41	5
3	KAR	4	6	2	4	40	10
4	SIT	4	4	0	4	43	1
5	RAJ	3	9	6	3	36	11
6	MAR	3	4	1	3	40	18
7	LIM	3	6	3	3	40	19
8	ERF	2	2	0	2	46	0
9	ATI	2	6	4	2	37	32
10	KHA	2	2	0	2	45	0
11	LEE	2	2	0	2	57	2
12	SUK	2	5	3	2	49	8
13	NIZ	2	2	0	2	59	1
14	AZA	2	3	1	2	44	12
15	HAF	2	2	0	2	47	0
16	NAZ	1	1	0	1	59	0
17	MAH	1	1	0	1	57	0
18	VAS	1	1	0	1	47	0
19	RAD	1	1	0	1	47	0
20	GEE	1	2	1	1	57	2
21	PUR	1	1	0	1	47	0
22	SOR	0	0	0	0	0	0
23	KOM	0	0	0	0	0	0

Density value for the whole forum: 0.11 (From NetDraw output)
[a]Course coordinator

3.3 Betweenness Centrality

Bridging participants are the main link that connects all participants in the network to deliver information. Based on Table 2, the participants who gained high *betweenness* values in the forums are ATI (32), HIL (24), LIM (19), MAR (18), and AZA (12).

3.4 Density

A higher *density* value indicates that more participants in the network have direct contact with each other, and this also means that the network contains strong connectivity. In addition, the *degree* value indicates the number of participants that each student communicates with. For example, the *degree* value for HIL is 9 (Table 2) which indicates that HIL has nine links or has communicated nine times. Based on Table 2, it was found that 10 students have between 3 and 9 links/*degree*s, while 13 students have between 0 and 2 links. The forum is considered dense if it had a high *density* value which is more than 0.75. However, the overall communication among the participants in the forum is low as the network *density* value is 0.11.

4 Discussion

There are only five participants, namely, ATI (32), HIL (24), LIM (19), MAR (18), and AZA (12) and also INU (128 – course coordinator) who have been identified as bridging participants. The difference of range in *betweenness centrality* values between students and course coordinator indicates that the participants tend to communicate to the coordinator more than their peers. This result is similar to previous findings, which stated that participants tend not to form strong connections among peers in an instructor-driven forum, but highly connected to the course instructor (Doran et al. 2011).

According to Lipponen et al. (2001), when the post sent uninspires others, this will cause others not to reply. As such, this study identified 11 students (SIT, KHA, LEE, NIZ, HAF, ERF, MAH, NAZ, PUR, RAD, and VAS) as isolated participants who posted their messages in the forum but did not receive any feedback. They were also identified as at-risk students because they have the tendency of becoming low-performing students as they had low level of interaction in the online forum session. As such, low interaction students are associated with lower grades (Davies and Graff 2005). Also, students with lower grades mostly are not fluent writers and readers as they may face difficulty in expressing themselves through the text, and this is supported by previous studies (Lipponen et al. 2001). Macfadyen and Dawson (2010) also found that participants who engaged actively in the forum achieve higher overall final grades.

5 Implication of Findings

Based on the findings, several implications to increase students' engagement in forum discussion session were identified. Firstly, social network analysis allows instructors to identify their students' patterns and levels of social interaction during the course. This information will be useful, especially in identifying the students who are at risk, or isolated participants. It will also identify those who are the leaders of the information and bridging participants who can provide the necessary assistance to their peers. In addition, early identification of students with the highest *degree* and *betweenness* allows the instructor to group them in different discussion groups for the interactive discussion to take place. Moreover, the interaction should occur in the form of two-way communication to enhance the learning process. Collaborative discussion approach can be implemented to increase the interaction level in the forum.

6 Conclusion

This study proposes some analyses to measure the patterns and levels of interaction in an online forum among a group of participants. As learning through LMS has been widely accepted and practiced in many higher institutions of learning, interaction in online forum is of importance. To achieve meaningful learning in such environment, each student plays an important role to participate and contribute to the forum. Through such environment, the instructor can identify the students' patterns of interaction and provide the necessary guidance to assist their learning.

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Active Learning in Higher Education: A Case Study

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Abstract This study is an attempt to analyse the active learning practices among students and lecturers in a higher learning institute in the United States. This study is a qualitative study with five undergraduates, five postgraduates and five instructors as the informants. The instruments used were classroom observations, interviews, open-ended section in the questionnaires and relevant document research. The high level of agreement among students indicated that active learning had been practised widely in higher education. The finding indicated students in higher education were fond of active learning to achieve optimum learning outcomes. The findings indicated that active learning is best conducted through group discussion, project and case study and is best used with strategies such as assigned reading, project paper, case study and reflective writing. The findings proposed that strategies promoting active learning be defined as instructional activities involving students in doing things and thinking about what they are doing.

Keywords Active learning • Feedback • Higher education

1 Introduction

1.1 Active Learning

Throughout the 1980s, numerous leaders in the field of higher education (Cross 1987) and a series of national reports (Study Group 1984) repeatedly urged college and university faculty to actively involve and engage students in the process of learning.

Consequently, many lecturers assert that all learning is inherently active and that students are, therefore, actively involved whilst listening to formal presentations in the classroom (Bonwell and Eison 1991: iii). Furthermore, the analysis of research

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literature (Chickering and Gamson 1987) suggests that students must do more than just listen. They must read, write, discuss or be engaged in solving problems. One response to these questions is found in the observation that:

> Students learn both passively and actively. Passive learning takes place when students take on the role of "receptacles of knowledge"; that is, they do not directly participate in the learning process … Active learning is more likely to take place when students are doing something besides listening. (Ryan and Gretchen 1989: 20)

Increased activity would include making a sustained effort to take exemplary nonliteral, paraphrased lecture notes, monitoring one's level of understanding the subject matter and writing questions in the lecture notes when confused and asking questions at appropriate points in an instructor's presentation. Students' involvement can be further increased by the instructor's use of such strategies as using discussion-leading and questioning techniques skilfully to engage students in a personal exploration of the subject matter, having students engage in short writing activities in class followed by sharing what they have written in small groups and using presentations, debates and role-playing activities by students (Bonwell and Eison 1991: 2). More importantly, to be actively involved, students must engage in higher-order thinking tasks as analysis, synthesis and evaluation. Within this context, it is proposed that strategies promoting active learning be defined as instructional activities involving students in doing things and thinking about what they are doing (Bonwell and Eison 1991: iii). Though the term "active learning" has never been precisely defined in educational literature, some general characteristics are commonly associated with the use of strategies promoting active learning in the classroom (Bonwell and Eison 1991: 2):

- Students are involved in more than listening.
- Less emphasis is placed on transmitting information and more on developing students' skills.
- Students are involved in higher-order thinking (analysis, synthesis, evaluation).
- Students are engaged in activities (e.g. reading, discussing, writing).
- Greater emphasis is placed on students' exploration of their own attitudes and values.

It is clear that learning can be empowering. Good students know this. They are used to success and praise for their accomplishments. However, there are a few students in every classroom who tend to learn differently than their most successful classmates. Their idiosyncratic ways of approaching schoolwork tend to result in continual evaluations that they are behind or at least that their work is not acceptable (Morton 1999). It is assumed that in order to help these students make progress and be engaged in learning, it is important to tap their interests sometime during the instructional day. If this is not possible, then the individual needs to at least realize that, along with the ideas of their classmates, their ideas are valuable and are validated by the teacher (Morton 1999: 8). The belief that the relationship between the teacher and the student has a large impact on students is another major assumption of Morton's study. It is also assumed that the teacher needs to believe that each

student can learn. The tendency is to compare each student against the most successful student in the classroom, and this tendency results in treating others as deficient. A more empowering way is to appreciate the strengths in all students and to help them appreciate their hard-won achievements.

Based on a phenomenological study conducted by Morton (1997) with six high school students to determine what they thought teachers did that kept them interested and engaged. Students freely told of what they did not like: repetitive, boring, meaningless worksheets and other routine assignments, lack of teacher enthusiasm about the subject, favouritism towards the few "preps" and "jocks" in the classroom and social cliques whose dominance and exclusivity made it uncomfortable for other students to be in the school (Morton 1999: 3–4). They did reminisce about being enthusiastic and interested, but these joyful memories often were of their elementary school years. According to Morton (1997), her informants like hands-on activities, group work in which the teacher set up the groups so that various social groups were represented, interesting discussions and personal contact with and validation of their ideas and thoughts from the teacher. The students described teachers who made school interesting and said that they felt that all teachers could do something to change the dull routines of school and improve school situations.

Morton (1999: 3) in another observation study with 34 fifth graders of an exemplary classroom where active learning was taking place identified that the classroom was a place where all students were involved in meaningful curriculum, and learning was a realized goal for all. This case study revealed a dedicated teacher who made a conscious effort to connect with individual students on a continuous basis, used many alternative methods to help students learn content, required mutual respect between herself and the students as well as among the students and displayed a sincere interest in the students' learning and her own learning as well. The research further confirmed that keeping students as willing participants in classroom is more successful when there is a supportive connection between teacher and students and when efforts are made to appeal to individual interests. Incorporating students' interests and allowing choices are methods that serve to indicate a genuine interest in students and so ultimately validate the students' worth.

Repeated drill and concentration on teaching isolated skills in order to improve scores on standardized tests may work for a few highly book-and-paper-oriented students who come from language-rich backgrounds, but such practices tend to result in many disengaged students. With the increasing changes in the demographics of the United States and the increasing number of children living in poverty, diversity in classrooms requires diversity in instruction. Curriculum engagements that invite all students to learning rather than sort them into levels of performance on standardized tests are needed to increase the involvement and comfort levels in classrooms (Morton 1999: 10). Another study by Bonwell and Eison (1991) has also shown that students prefer strategies promoting active learning to traditional lectures.

Other research studies evaluating students' achievement have demonstrated that many strategies promoting active learning are comparable to lectures in promoting the mastery of content but superior to lectures in promoting the development of

students' skills in thinking and writing. Further, some cognitive research has shown that a significant number of individuals have learning styles best served by pedagogical techniques other than lecturing. Therefore, a thoughtful and scholarly approach to skilful teaching requires that teachers/lecturers become knowledgeable about the many ways strategies promoting active learning have been successfully used across the disciplines. In other words, each teacher/lecturer should engage in self-reflection, exploring his or her personal willingness to experiment with alternative approaches to instruction (Bonwell and Eison 1991: iii–iv).

2 Methodology

This study applies the qualitative research approach. In this study, the researcher used open-ended questions in the questionnaire, interview questions and document analysis to collect data. The sample population comprised 181 undergraduate and postgraduate students and 22 instructors from the School of Education. Questionnaires using a 6-point Likert scale were administered to all 203 respondents, whilst interviews were conducted with five undergraduates, five postgraduates and five instructors to shed some light on teaching, learning and assessment practices in higher education. The main purpose of this paper is to identify the active learning practices in the higher education in the United States. Besides that, two courses were chosen for observation purpose to gain a deeper understanding of the teaching, learning and assessment practices in the authentic context. Besides that, relevant documents such as syllabus, assignment guidelines, sample assignments and lecture notes were also scrutinized to get a better picture of the courses studied that have triggered active learning in higher education.

3 Findings and Discussion

The answers provided by the respondents in the open-ended section in the questionnaires indicated that active learning was not a magic solution in higher education (Table 1). A total of 52 out of 181 student respondents (28.73 %) stated that active

Table 1 Active learning works better with some students

Active learning works better with some students	Frequency	Percent
Active students	52	28.73
Some students	37	20.44
Most students	9	4.97
Weak students	7	3.86
No response	76	41.99
Total	181	100.00

learning was only suitable for some students who were active, extrovert, outgoing, outspoken, not shy, sociable, visual learners, capable, critical, divergent and self-motivated, have good command of communication and prefer hands-on. The findings also indicated that a substantial number of student respondents (20.44 %) stated active learning was not only good for some students. In fact, only a small number of student respondents (4.97 %) insisted that active learning was suitable for all students. Interestingly, seven student respondents (3.86 %) highlighted that active learning was actually only suitable for weak students and students who had problems to pay attention in the class. Two of the respondents (1.10 %) stated that active learning was suitable for international students who had problem to participate in the classroom activities and discussions. Hence, they needed an active learning environment in order to engage them in the learning process. A total of 76 students (41.99 %) did not provide any response in their questionnaires. This finding was coherent with the study conducted by Chickering and Gamson (1987) who suggest that students must do more than just listen; however, different students might have different preferences. According to Auster and Wylie (2006), students of higher education demand an active learning environment to provide high-impact experience which will be fully utilized in their future career.

Two of the instructors interviewed informed that the mode of learning varied from one student to another. This indicates that instructors should apply multiple strategies in their classroom. Interview with one instructor who was highly regarded by his students told that he normally started his class by lecturing for about an hour. Next, he would divide his students into smaller groups for discussion before they come out for a presentation. Two of his students revealed that they had no problem paying attention to his class because his class was well organized and very interesting. His voice was loud and clear and attractive to all his students. In addition, he was considerate and willing to help students to learn. Hence, his students were strongly engaged in his class. They further added that their instructor was humorous and talented. During his class, he would always sit in to ask questions to trigger students' thinking. Sometimes, during the presentation, he would participate in the students' role play activities and have a lot of fun of learning together with his students. His students told that he also provided a lot of feedback to their assignments and presentations. He normally ended his class by having one or two student presentations and a short discussion relating to students' assignments. His students were very satisfied with his class. The active learning tactics adopted by this lecturer had been highly advocated by Bonwell and Eison (1991) and Morton (1997, 1999). Diamond et al. (2008) further stressed that active learning is implemented from guided experiences whose content is determined by the students. This means that the instructor acts as the facilitator to guide the learning of the students which has been portrayed by this lecture.

A total of 38 students (20.99 %) pointed out in the questionnaires that small group discussion was the best strategy to trigger active learning in the class (Table 2). Interviews with three instructors confirmed this statement. All three instructors told that they employ small group discussions in the class so that students can discuss in a group and share their opinions with their peers. D'Andrea and Gosling (2005: 25)

Table 2 Best strategies for triggering active learning in higher education

Best strategies for triggering active learning	Frequency	Percent
Small group discussions	38	20.99
Classroom activities	30	15.79
Hands-on activities	6	3.16
Questioning techniques	6	3.16
Small assignment	5	2.62
Classroom management	4	2.10
Debate	4	2.10
Group work	4	2.10
Reading materials	4	2.10
Presentation	3	1.57
Technology	2	1.05
Feedback	1	0.53
No response	83	43.68
Total	190	100.00

listed "active learning, deep learning, diversifying assessment, learner-managed learning, peer review of teaching, personal development planning, problem-based learning, student-centred learning, using learning technologies and work-related learning" through assignments to enhance teaching and learning. Referring to Pedersen (2010), active learning approaches are conducted with the purpose of immersing the students into the learning environment using the methods of collaborative learning in which the teaching and learning occurs through group interaction.

One of the instructors revealed that all students in her course were expected to be active learners, which required each student to take an active role in their own learning and to share the learning process with the class. She urged her students to read all assigned materials and make notes of questions, inconsistencies, areas of interest and connections they found to other readings so that they could participate in the classroom discussion actively. According to her, active participation in class discussions allowed each student to test his or her own assumptions about student development as well as expanded the world view of others in the class. This finding supported Angelo's (1995) urge to include inculcating higher-order thinking skills, basic academic success skills, discipline-specific knowledge and skills, liberal arts and academic values, work and career preparation as well as personal development among students as in the Teaching Goals Inventory. According to Kieffer and Lesaux (2010), active learning promotes the development of thinking skills. For example, teaching the students cognitive learning instead of giving them the answers will train the students to think independently on reasoning and solutions of problems (Kieffer and Lesaux 2010).

Two postgraduate students stated in the interviews that they always see new things in the small group discussions. They discovered that they could understand things better because this kind of activity engaged them in thinking and becoming

more active in learning. Besides that, a substantial number of students ($n = 30$) stated that they enjoyed classes which employed classroom activities such as mini lectures, prompts and intervals (Table 2). This result is in coherent to the study conducted by Thibodeau (2008) which concluded that techniques such as prompts and intervals are interactions in the classroom which can engage the students to learn actively, thus proving the role as the lecturer to be active instead of passive. This finding was further supported by two other instructors interviewed. Other strategies such as hands-on activities and questioning techniques were raised by six students. Five students mentioned small assignment as the best strategy. Four students indicated that classroom management needed to be improved to trigger better active learning in the class. Other strategies such as debate, group work, reading materials, presentation, technology and feedback were also mentioned by very few students ($n < 5$). There were 83 students (43.68 %) who did not provide any response regarding the best strategies for triggering active learning in higher education (Table 2).

4 Conclusion

The high level of agreement among students on active learning indicated that active learning had been practised widely in higher education. The respondents further suggested that active learning should only be taught to active students, is best conducted through good discussion and is best used with strategies such as assigned reading, project paper, case study and reflective writing. The identification of active learning does have a positive impact on student learning. Hence, numerous researchers have described clearly the need for active learning in the classroom as follows:

> Learning is not a spectator sport. Students do not learn much just by sitting in class listening to teachers, memorizing pre-packaged assignments, and spitting out answers. They must talk about what they are learning, write about it, relate it to past experience, apply it to their daily lives. They must make what they learn part of themselves. (Chickering and Gamson 1987: 3)

> When students are actively involved in … learning …, they learn more than when they are passive recipients of instruction. (Cross 1987: 4)

> Students learn by becoming involved … Student involvement refers to the amount of physical and psychological energy that the student devotes to the academic experience. (Astin 1985: 133–134)

> Learning is an active and goal oriented process; Learning is meaningful and strategic; Learning activities should be developmentally appropriate and have continuity, sequence and integration. (Baker 2006: 52–54)

The above learning theories reflect some of the ideas of America's leading learning theorists such as Ralph Tyler (1902–1994) and John Dewey (1859–1952). They and others have provided a sound foundation for today's best practices for teaching and learning and testing. The best practices flow from well-researched theories. When applied in a judicious way and tailored by the teacher to the individual

classroom needs, these theories help prepare students for the twenty-first century (Baker 2006: 52–54). The aforementioned learning theories have become the framework for many current best practices.

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Part IV
Networking and Collaboration

Establishing a Holistic Approach for Postgraduate Supervision

Gurnam Kaur Sidhu, Sarjit Kaur, Yuen Fook Chan, and Lai Fong Lee

Abstract The internationalisation and democratisation of higher education in the twenty-first century has raised myriad issues surrounding postgraduate supervision. Research supervision which was once regarded as a 'private space' defining a narrow and intense relationship between an academic and a research student is today viewed as a multidimensional relationship involving a fabric of interwoven experiences which necessitate a more holistic approach to postgraduate research supervision. This paper proposes to put forward a holistic approach to support postgraduate supervision based on the findings derived from a study conducted in two public universities in Malaysia. The study involved a total of 66 Malaysian postgraduate students and 30 supervisors. Data were collected using questionnaires and semi structured interviews. The study investigated aspects such as the roles and responsibilities of supervisors, qualities of the good supervisor, supervisory practices and challenges faced by both parties. Initial findings indicated that there were differences between supervisors' and supervisees' expectations of the roles and responsibilities of their supervisors and supervisory practices. Nevertheless, both supervisors and supervisees highlighted similar issues and challenges such as the need for research students to develop competence and confidence in the following skills: academic reading, writing, research and conceptual skills. Postgraduate supervision should be viewed as a facilitative process involving a number of domains and processes that can help student progress their candidature through effective mentoring and providing support for student participation in academic practice. Therefore, based on the findings the proposed holistic approach for postgraduate supervision takes into consideration the tenets laid down by educationists such as Maslow, Rogers, Gardner and Vygotsky alongside the four main domains of the Malaysian National Education Philosophy so that students are cognitively, spiritually, emotionally and physically balanced.

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Keywords Postgraduate • Holistic supervision • Research student • Postgraduate supervision

1 Introduction

The Organisation for Economic Cooperation and Development (OECD) noted that the 'expansion of tertiary education has been remarkable' in the last 50 years (OECD 2008, p. 41) due to the advent of the Information Age leading to the internationalisation and massification of higher education. Today, institutions of higher learning (IHL hereafter) offer more flexible and diverse learning modes that allow adult learners to make a comeback to schools in order to pursue their studies and upgrade their skills.

With the quest to produce a high-quality knowledgeable workforce, universities all around the globe, including Malaysia, have witnessed an increase in postgraduate enrolments. In a move to help Malaysia become and remain a keen competitive global player in today's fast-changing landscape of higher education, the government launched the Higher Education Strategic Plan in 2007. One of the initiatives, known as MyBrain15, aims to produce 21,000 PhD holders by 2023 (Ministry of Higher Education, Malaysia 2007). This is seen as a pertinent move towards creating a critical mass of knowledge workers who can contribute to Malaysia's nation-building.

Notwithstanding this scenario, Cassuto (2013) notes that whilst postgraduate numbers have increased over the years in IHL all around the globe, close to 50 % of postgraduate research students often leave without completing their doctoral study. This was also articulated by Smallwood (2004) who reiterated that the attrition rate for PhD programmes is between 40 and 50 %. Furthermore, a study conducted by the Council of Graduate Schools revealed that only 49 % of PhD postgraduates in the field of humanities complete within 10 years, whilst close to 64 % of engineering students complete their PhD within 10 years. The study also noted that a fraction takes longer than a decade to finish their degrees, whilst the majority of those who are not able to complete within 10 years will never earn a doctoral degree (Cassuto 2013). This 'disturbing' attrition rate has reverberated academics to stand up and take notice as attrition is often tainted with the connotations of failure, loss, despair, dropouts and a waste of human capital. In his article, Cassuto (2013) highlighted the experiences of Barbara E. Lovitts who almost became an attrition statistic herself. She highlighted that graduate programmes often do such a bad job of retaining their students, and she blamed the culture of graduate school which cultivates a 'pluralistic ignorance' in which everyone involved, i.e. the deans, faculty members and students themselves, tend to blame the departing students for leaving.

This situation is also apparent in IHL in Malaysia. Whilst Malaysian universities have been extensively involved in research and have been producing doctoral students, it is disparaging to note that the number of doctoral graduates produced by each institution has been substantially low. There are numerous factors that can be viewed as significant predictors of candidate completion rates. These include variables

such as age, gender, candidature status (part or full time), discipline (sciences or humanities), availability of research funding, research topic suitability, inadequate advising, the intellectual environment of the department and access to appropriate equipment and computers. In the Malaysian context, Sidhu et al. (2013, 2014) highlighted that both Malaysian postgraduate students and supervisors felt research students lacked the required research and analytical skills. A study carried out by Latona and Browne (2001) revealed that the following three main factors contribute to high attrition rate: institutional/environmental (e.g. protocols and procedures, infrastructure support, research culture, scholarly community), supervisory practices (e.g. type and frequency of feedback, supervisory meetings, student-supervisor relationship) and students' characteristics (entry requirements, financial, personality traits). Other researchers (Cassuto 2013; Smallwood 2004; MOHE 2007; Sidhu et al. 2013, 2014) have also outlined similar factors at play including poor and low-quality higher education facilities and poor quality postgraduate supervisory practices. Interestingly, a study conducted by Cullen et al. (1994) found that the demographics of the supervisors such as age, gender, graduate education background and teaching responsibilities also have a significant effect on their supervisory practices. According to Sidhu et al. (2013), postgraduate supervision in Malaysia leaves much to be desired as research students often feel alienated as they long for a 'people-orientated' supervisor who understands their needs and shortcomings. All these findings put a critical demand on postgraduate supervision in ensuring quality research work leading to innovation and 'knowledge creation'. Henceforth, postgraduate or research supervision has become an increasingly demanding role for supervisors because they are critical players in candidates' successful completion of their research studies.

2 Literature Review

Supervising postgraduate students is increasingly viewed as a stressful experience for many supervisors in academic contexts around the globe. Calma (2007) points out that postgraduate supervision is a 'professional practice' and it is fast becoming an evolving field of research interest not only among 'supervisors and candidates but also for other stakeholders who wish to examine it' (p. 91). Furthermore, postgraduation has been given serious consideration in most institutions of higher learning in developed countries like the United Kingdom, the United States, Australia and Sweden where supervisory training has been formalised. For example, in the United Kingdom higher education particularly postgraduate supervision is more formalised and has a more institutionalised model in which the whole range of institutional entities is clearly and properly spelt out (Delamont et al. 2004). The National Qualifications Assurance Agency for Higher Education has a code of practice for supervision, the institutional code of practice for the department, the supervisor and the student as well as the support and advice agencies available to

students in such universities (Masembe and Nakabugo 2004). Besides that, every doctoral student is legally entitled to work with a trained supervision that has undergone a structured supervisory training.

Supervision has been defined in a variety of ways; nevertheless, similarities do exist. For instance, Laske and Zuber-Skerritt (1996) view research supervision as a process of fostering and enhancing learning, research and communication at the most advanced level of teaching in the educational system where the supervisory process is complex, subtle and crucial to the success of graduate students. Sze (2007) points out that effective supervision can be seen through effective performance by the supervisee. This is because in their professional development, supervisees learn their strengths and limitations and keep track of their overall progress. Sze (2007) went on further to add that postgraduate supervision is a good illustration of the relationship between social constructivism and effective education practice. Meanwhile, Thompson et al. (2005) stressed that research supervision is an important aspect for the development of researchers, academic staff as well as the research activity itself. As the quest for quality education or having an academic degree is increasing each day, research activity must be of high quality. Therefore, the university must offer good supervision to the students for them to be highly competent in their research area.

Lessing and Schulze (2002) highlighted that a supervisor's roles are to guide, advise, ensure scientific quality and provide emotional support to the supervisees. Different people have different opinions on the specific roles of supervisors. Some researchers are of the opinion that it is better to treat the supervisees as an independent researcher, whilst others argue that supervisees can be dependent on the supervisors. However, it has been agreed that supervisors need to let their supervisees be in the middle where they are both independent and dependent. Supervisors need to draw a line and make things balanced. There is a danger in spoon-feeding the supervisees, and this should not be happening in the supervision process (Thompson et al. 2005).

Furthermore, supervisors today need to understand that with the democratisation of higher education, the postgraduate profile is no longer dominated by young graduates on scholarships but by mature and experienced students whose work/practical knowledge may be more than that of the supervisor and who want a higher degree in order to remain competitive and relevant. In addition to such a phenomenon, a report by Attwood (2009) highlighted that close to 40 % of postgraduates are part-time students and henceforth this 'forgotten' group's profile has to be addressed in postgraduate supervisory practices. The gradual shift towards the increasing numbers of this type of postgraduate research students brings forth a number of issues of supervision for university lecturers to consider during research supervision.

Despite such concerns, several researchers have formulated a variety of empirically driven frameworks outlining and assessing the manifold characteristics of supervisory practices. According to Delany (2014), effective postgraduate supervision is a 'complex multifactorial process', and it encompasses a myriad of issues from various levels ranging from the individual students and supervisors 'to available infrastructural support and to institutional and governmental policies, structures and procedures' (p. 2). Pearson and Kayrooz (2004) as cited in Delany add that the

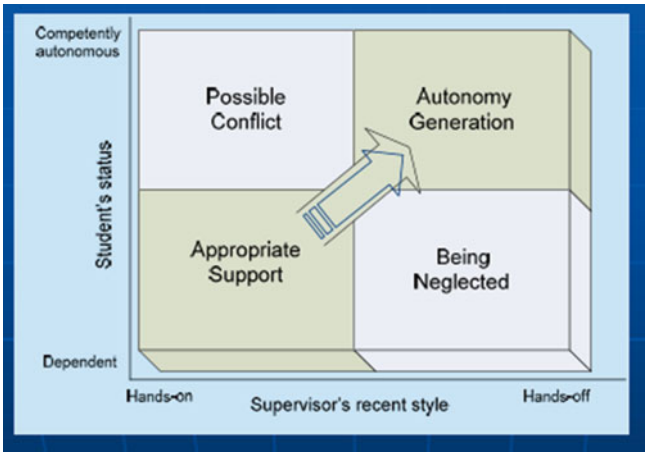

Fig. 1 Dynamic alignment model (Gurr 2001, p. 87)

development of academic supervisors and supervisory models has been constrained by a lack of a conceptual understanding of what supervision actually involves. Grant and Graham (1999) suggest that the majority of these approaches to understanding and practising supervision emerge from a liberal humanist view of social relations in which supervision is understood to be an essentially rational and transparent engagement between autonomous individuals. They argue that additional useful insights into the subtleties and complexities of supervision can be gained from considering supervision within a broader psychoanalytic context. On the other hand, Gurr's model (2001) as shown in Fig. 1 seeks to raise awareness and can be used as a dialogue between the supervisor and the student to establish a shared understanding leading to the supervisor establishing an appropriate hands-on or hands-off supervisory style. The supervisor can also opt for Anderson's (1988) model which is characterised by two main dimensions (i.e. a 'direct'/'indirect' and an 'active'/'passive' dimension) comprising the following four styles of supervision:

Direct active style which is characterised by initiating, criticising, telling and directing the student

Indirect active style which is characterised by asking for opinions and suggestions, accepting and expanding students ideas or asking for explanations and justifications of supervisee's statements

Indirect passive style that is characterised by listening and waiting for the student to process ideas and problem solve

Passive style which is characterised by having no input and not responding to student's input

A review of related literature also indicates that postgraduate supervision is a much explored field in the west, but there is scant empirical research on postgraduate supervision in Asia, particularly Malaysia. In many institutions in Malaysia, supervision still follows the stand-alone supervisor which places great stress on one supervisor

to guide the student to successful completion amidst a full load of teaching and administrative duties. Furthermore, there is no established national 'code of practice' for postgraduate supervision, and training for supervisors is not mandatory though some research universities in Malaysia do conduct some form of training and distribute a handbook on guidelines and codes of conduct for postgraduate supervision. This paper puts forward the findings from a study conducted to investigate both supervisors' and supervisees' expectations and perspectives of postgraduate supervision in two established public universities in Malaysia. Based on the findings, the researchers would like to propose a holistic approach to postgraduate supervision that may very well have the potential to be used in Malaysian public universities.

3 The Study

The main aim of this exploratory study was to investigate the perspectives of Malaysian supervisors' and supervisees' on postgraduate research supervision in order to establish a holistic approach for postgraduate supervision in Malaysia. The perspectives were explored from the following dimensions: roles and responsibilities of supervisors and supervisees, effective supervisory practices, supervisors' personal and leadership/mentoring characteristics and institutional and supervisors' support. This study employed a descriptive research design involving Malaysian postgraduate PhD research-based students and supervisors who had more than 3 years of supervisory experience. The study involved two Malaysian public universities referred to as University A (UA) and University B (UB); acronyms were used for the two universities as both universities wished to remain anonymous. A total of 66 Malaysian postgraduate students and 32 supervisors from the social sciences discipline participated in the study. Semi structured interviews were conducted with 12 postgraduates (6 respondents from each university – referred to as RUA1–RUA6 and RUB1–RUB6) and 6 supervisors (3 from each university – referred to as UA1, UA2, UA3, UB1, UB2 and UB3).

Data were collected using two questionnaires (one for the supervisors and one for the supervisees) and semi structured interviews. Each of the questionnaires comprised 7 sections and contained 90 items with 5 open-ended questions. Both the questionnaires were pilot tested at another public university in Malaysia, and the overall alpha coefficient was .892 (supervisees' questionnaire) and .823 (supervisors' questionnaire). Both descriptive and inferential statistical analysis procedures were used to analyse the data. The semi structured interviews were analysed both deductively and inductively to address the concerns of this study.

4 Findings

This section presents the main findings obtained from the study.

4.1 Demographic Profile

Investigation into the demographic variables indicated that out of the 66 postgraduate respondents from the two universities, 77.3 % were females, whilst the remaining 22.7 % were males. In terms of the number of supervisors, more than half of the respondents (56.1 %) had only one supervisor, whilst another 18.2 % had two supervisors. Findings also revealed that 69.7 % of the respondents were in their first year of study, 12.1 % were in their second year and 9.1 % of the respondents were in their third or fourth year of study. Regarding the stage of the study, the results showed that almost half of the respondents (49.2 %) were at the stage of writing their proposal, 18.5 % were working on their literature review, 7.7 % were collecting data, 4.6 % were analysing data and 9.2 % were reporting their findings. Only 1.5 % of the respondents were waiting for their viva voce examination.

Out of the 32 supervisors, a total of 25 (78 %) were females, whilst the remaining 7 (22 %) were males. Close to 28 % (9) had been supervising PhD scholars for more than 10 years, whilst the majority – i.e. 20 lecturers (62.5 %) – had been supervising PhD students for less than 5 years. Only eight (25 %) supervisors had gone for training on postgraduate supervision (duration of 2–3 days), whilst the rest had just attended a day or a lecture on postgraduate supervision. All the supervisors admitted that they were not accredited supervisors.

4.2 Supervisees' Perspectives on Postgraduate Supervision

A large majority of the respondents felt that their supervisors should instil motivation and confidence (M = 3.62, SD = .548) in them when pursuing a postgraduate degree. They also expected supervisors to be good research role models (M = 3.59, SD = .581), demonstrate their knowledge and understanding of research methodology (M = 3.58, SD = .609), possess good communication skills (M = 3.56, SD = .530) and provide timely and constructive feedback (M = 3.50, SD = .562). These respondents also expect a supervisor to ensure their candidates complete their research study on time (M = 3.44, SD = .583), advise candidates on research ethics, help candidates identify suitable readings in the area of interest and encourage postgraduates to attend seminars and present papers (M = 3.39, SD = .699). Nevertheless, 8 out of the 12 students interviewed held their supervisors in high esteem, but another 4 highlighted that their supervisors were experts in their area and were unimaginably busy lecturers who were involved in numerous research projects. Therefore, it was difficult for the students to meet them, and often they had to wait for quite some time to receive timely or constructive feedback on their written draft chapters.

Findings also revealed that the respondents were moderately satisfied with their supervisors' supervisory skills such as their communication, negotiation, problem-solving and decision-making skills. They however had some reservations

with regard to publications. They felt their supervisors were not very encouraging to help them publish. In this regard, the interview data showed that Respondent RUA3 was very much *left on my own* when she wanted to present a paper at a national conference. She pointed out that her supervisor was *not very happy* when she did not put the supervisor's name on her paper.

Data from interview sessions indicated that all the respondents were generally satisfied with their supervisors. Respondents also highlighted that they appreciated supervisors who took upon their role seriously and helped them in their 'academic journey'. All the students also reiterated that the supervisor must be an expert and should have good knowledge in research methodology. Respondent RUA5 stressed that it was 'not important if my supervisor is not an expert in my area but the supervisor must make it a point to understand and perhaps help me where I can go for help when needed'. Respondent RUB1 highlighted that the 'supervisor-supervisee' relationship is a delicate one' and as students they had to learn to 'balance it well so as that students do not antagonise the supervisor'. She further stressed that there was no remedy for a poor supervisor (RUA2). The following excerpts show some of the main issues raised by the students with regard to supervisory practices:

- Respondents (RUA3, RUA3, RUA6, RUB2) stressed that a supervisor should be a 'people-oriented person' and 'understand them as a person first and then as a researcher'.
- A supervisor must be 'kind and understanding' and not 'scold', 'look down' or talk condescending to students. They should be 'patient' and willing to give time to students to learn and improve.
- Supervisors must have good and positive communication skills and provide constructive feedback.
- Respondent RUB4 said she felt 'insulted' and she lost all her self-esteem when her supervisor said that her Phd write-up draft was 'littered with grammatical errors and worse that an undergraduate's academic exercise'.
- Supervisors must not discuss their students' work and limitations with other supervisors or students in the faculty. They must be professional and maintain 'integrity at all times' (Respondent RUA5).

Moderate satisfaction was also articulated with regard to information and facilities provided to them as postgraduate students. They expressed a low level of satisfaction to institutional support (M = 2.74, SD = .589) such as information on postgraduate programmes (M = 2.86, SD = .726), guidelines of postgraduate programmes (M = 2.86, SD = .788) and information on the academic staff (M = 2.80, SD = .689). They were least satisfied with the lack of funding to present their work at conferences (M = 2.52, SD = .780) and a suitable work space and access to facilities (M = 2.52, SD = .943). Data obtained from open-ended questions and interview sessions further corroborated these findings.

4.3 Supervisors' Perspectives on Postgraduate Supervision

A majority of the supervisors (28 = 87.5 %) highlighted that they had not attended any formal supervision course and none of them were accredited supervisors. Therefore, supervision was learnt through their own experience from having been supervised during their doctoral studies. Four out of the six supervisors interviewed shared some pleasant and good supervisory experiences, whilst two felt that their PhD supervisors left much to be desired. As such, they read and worked hard to influence their own practice. All six also admitted that supervision encompassed both coaching and mentoring. For instance, Supervisor UB3 highlighted that there were times when she had to sit down and spend a few hours to coach her PhD student how to analyse qualitative data.

A large majority of the supervisors agreed that as supervisors they should be good research role models (M = 3.67, SD = .421), demonstrate their knowledge and understanding of research methodology (M = 3.98, SD = .534), possess good communication skills (M = 3.76, SD = .221) and provide timely and constructive feedback (M = 3.23, SD = .612). They expressed moderate agreement to aspects such as providing motivation and confidence (M = 2.32, SD = .235) to students and helping them solve their personal and emotional problems (M = 2.76, SD = .523).

Interview sessions further revealed that all six respondents agreed that a supervisor plays a pivotal role in the success of a postgraduate student. They also unanimously agreed that a postgraduate student will be successful if he/she takes ownership of the study and has the passion, drive and willingness to work hard for the PhD. All felt that they were able to perform their roles and responsibilities favourably well, but respondents UA3 and UB2 admitted they were rather busy and sometimes they were not able to provide timely feedback to their supervisees. They also highlighted that communication skills were very important in the supervisory process and as supervisors they must be available and easily contactable via email, SMS and phone. They also agreed that as supervisors they must be professional, supportive and encouraging. The analysis of the interview sessions revealed that the supervisors considered the following as some effective supervisory practices:

- Supervision is like good parenting. Therefore, supervisors must be patient and generous with their time.
- Be friendly, supportive, encouraging and motivating and respect students as learning individuals so that they do not fear supervisors. Supervisors need to help, encourage, coach and mentor their students.
- Provide reasonable timelines and monitor students' progress to ensure completion of research project according to mutually agreed time frame.
- Be professional at all time and maintain integrity. Do not cross the boundary.
- Give students the space to make mistakes and grow as researchers and encourage students to become confident, independent learners.

– Reassure students that change is inevitable and writing is a process, so writing many drafts and reflecting over the writing are *part and parcel* of doing a PhD.
– Never return a student's draft without any annotations or critical constructive feedback.

These superiors also raised a number of issues which stood in the way for effective supervision. All six respondents interviewed highlighted that a majority of the PhD students were rather dependent on their supervisors and hence did not take responsibility or ownership for their study. They also stressed that in many a case, noncompletion or attrition rates among research-based candidates were due to lack of discipline, low motivation, poor time management and limited knowledge and skills in research. These supervisors also reiterated that a majority of research students had limited research and conceptual and academic reading and writing skills. They felt that faculty and institutions need to equip these students with research and study skills so that students can develop into autonomous self-directed learners who can take responsibility for their PhD study.

5 Establishing a Holistic Approach for Postgraduate Supervision

The findings of this study revealed that there are some matches and mismatches between how the supervisees and supervisors viewed supervisory roles, responsibilities and practices. The supervisees look for more 'people-oriented' supervisors, whilst supervisors are more 'task orientated' where building relationships take a back seat. Students look forward to supervisors who are more caring and take time to understand their emotional, physical and spiritual wellbeing, whilst supervisors feel that their job scope encompasses a cognitive-based domain. A majority of the supervisees felt that as working adults, supervisors must treat them with some dignity and value their opinions and allow them to make mistakes as they are on a learning curve. They feel supervisors are rather 'impatient', but on the other hand, supervisors feel that as doctoral students they should display good conceptual knowledge, research skills and excellent academic reading and writing skills. Supervisors in this study also stressed that research students must be responsible autonomous learners who can take responsibility for their learning. In order to do that, they must be disciplined and task focused to complete their study on time. Furthermore, a qualitative study conducted by Hamidah Mohd, Faizah Majid and Izaham Shah (2013) in Malaysia further reveals that research students had three main contentions when dealing with their supervisors: supervisors' lack of positive communication, lack of expertise to provide support and power conflicts. Nevertheless, both supervisors and supervisees felt that the faculty and institution needed to provide more support to postgraduate students. Based on the empirical findings of this study, the researchers propose a holistic approach through which postgraduate supervision can be further enhanced. The implications of the findings

suggest the need to incorporate the perspectives of students and supervisors collectively to establish a holistic approach for effective supervision appropriate for the Malaysian context.

First, based on the understanding of holistic education which is both an eclectic and inclusive movement, the researchers in this study would like to propose a holistic approach to postgraduate supervision. Such an approach would rest on the philosophy of holistic education which aims to take a person on a journey towards finding identity, meaning and purpose in life through connections with the learning community to the natural world and to humanitarian values such as compassion and peace (Jarvis and Parker 2006). It also takes into consideration the chief tenets of holistic education which hinge on the fundamental principles of connectedness, wholeness and being. The concept of 'connectedness' entails elements of interdependence, interrelationship, participatory and nonlinearity. The concept of 'wholeness' is aligned to the rationale of 'the whole is more than the sum of its parts', indicating that whole systems have emergent properties that cannot be deduced by studying their components (necessity of having multiple perspectives, independence and acknowledging that systems have multiple levels). The concept of 'being' is about fully experiencing the present moment and entails the qualities of being fully human, having creative expression, experiencing growth and taking responsibility. Such concepts are then incorporated in holistic education, curriculum and learning. Henceforth, this holistic approach emphasises the importance and interconnectedness of all players in the supervision process (i.e. students, supervisors and the learning communities at the faculty and IHL) to work collaboratively to complete the task at hand (research project) in an integrated manner.

Similar concerns are also given prominence in Malaysia's National Education Policy (NEP), especially with regard to the attention accorded to experiential learning and the significance it places on relationships and primary human values within the learning environment. The NEP strives to pave inroads in 'further developing the potential of individuals in a holistic and integrated manner so as to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonious, based on a firm belief and devotion of God'. Malaysia's NEP aims to produce Malaysian citizens who are 'knowledgeable and competent, who possess high moral standards, and who are responsible and capable of achieving a high level of personal well-being, as well as being able to contribute to the betterment of the family, the society and the nation at large'.

Thus, keeping in line with the noble aspirations set out by Malaysia's National Education Policy and the main tenets of holistic education, we feel it is important that supervisors should help coach and mentor students in thinking and learning based on four main domains of the Malaysian NEP in an integrated manner so that students are cognitively, spiritually, emotionally and physically balanced (see Fig. 2).

Of these four domains, the cognitive domain is often the primary focus of most supervisory discussions and discourses as learning is often considered to be a cognitive process by most supervisors. In establishing a holistic approach for effective supervision, supervisors need to shed this exclusively unidimensional cognitive view as it ignores the fundamental dimensions of educative process (Nava 2008).

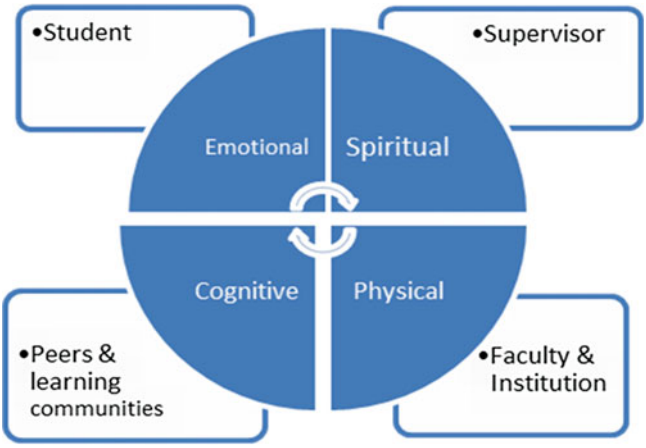

Fig. 2 Domains for supervision

Learning should be mapped against other literacies and multiple intelligences put forward by researchers such as Gardner (1993) and Goleman (2006) where intelligence is not seen as a single general ability of the person but as a whole. The traditional notion of cognitive intelligence is today considered far too limited, and supervisors need to cater for the broader range of human potential and talents. Goleman (2006), the proponent of emotional intelligence, suggests that when EQ which is made up of the four components of self-awareness, social awareness, self-management and relationship management is combined with conventional intelligences, one can predict successful leadership leading to successful fulfilment of a task.

Furthermore, learning happens in a social context of shared meaning, and the social domain develops one's 'people skills'. This helps one with the ability to not only get along with others but also learn collaboratively from peers and other learning communities. This is in line with the sociocultural-historical theory of Vygotsky's perspective where cognitive and social-emotional self-regulation should be viewed as an integrated unit, rather than separate domains. In this sociocultural perspective, students must be encouraged to work with their peers and learning communities. Supervisors must also provide the necessary help and scaffolding to help students in their Zone of Proximal Development (ZPD – where students cannot complete tasks on their own but are successful when aided) in order to promote learning and development.

Nava (2008) who presented the multidimensional multilevel model of holistic education stressed that the spiritual domain acquires a crucial centrality of education for the twenty-first century. It gets holistic educators to pause, reflect and investigate kosmic education as it allows one to have a wide vision of integral education so that we can educate with clarity, order and intelligence. It also means listening to our

inner life and thoughts through reflection and contemplative practice, intuition and insight and allowing space for self-expression and creativity. Interestingly, this is also in line with Malaysia's first pillar of nationhood (*Rukun Negara*) which is a belief in God and helps us recognise the true essence of who we are – i.e. spiritual beings. It is hoped that with the collaborative working together of students, supervisors, the learning communities and the faculty/institution within the framework of the integration of the four domains of education, a holistic framework can further enhance the supervisory process.

We need to keep in mind that PhD supervision is not a linear but a complex multifaceted process. The proposed holistic approach for postgraduate supervision also requires the building of a relationship between the students and the supervisor for the completion of the task at hand (i.e. the research project). Hence, in establishing a holistic approach towards effective supervision, supervisors need to take into account the multidimensionality of humanistic education so they can provide quality supervision to their students. The supervisory process requires helping the students through a journey of self-discovery and transforming them from a student to a researcher – i.e. taking students from the writing of the research proposal, conducting the pilot study, analysing data, writing the final report and preparing for the viva voce. The findings of this study revealed that supervisors were rather concerned with students' self-directed learning abilities and their limited knowledge and research skills. Hence, a holistic approach for postgraduate supervision needs to have supervisors helping, coaching and mentoring students to develop the necessary skills which will put them on the path of becoming autonomous learners who can take responsibility for their own learning (see Fig. 3).

There is also consensus in literature (Farmer and Sweeney 1994; Nunan 1997) that learners embarking on a PhD programme may be at different stages of autonomy. Hence, it is pertinent that supervisors need to first understand the following aspects: consider the student as a person with wants, desires and needs (person-oriented approach) and have an awareness of their level of autonomy and their take-off points. The supervisory approach should hence take into consideration aspects put forward by educational psychologists such as Maslow (1970) and Rogers (1951). According to McLeod (2007), Maslow postulated the theory of hierarchical needs based on a human developmental psychology theory where the initial five-stage model (1943, 1954) of basic needs (e.g. physiological, safety, love, esteem and self-actualisation) was expanded to include cognitive and aesthetic needs and later transcendence needs (1970). On the other hand, Rogers' (1951) emphasised the humanistic and client-centred approach that for a person to grow, they need an environment that provides them genuine openness, acceptance and empathy (being listened to and understood). The proposed holistic approach also incorporates Nunan's (1997, p. 195) five levels for encouraging learner autonomy. If students are at Level 1, students need to be made aware of themselves as learners and the goals of the task at hand. Supervisors can, for instance, help learners' identify their learning styles and their strengths and limitations in research skills. Learners at Level 2 are capable of being involved in selecting their own goals from a range of alternatives, whilst learners at Level 3 have the ability to modify and

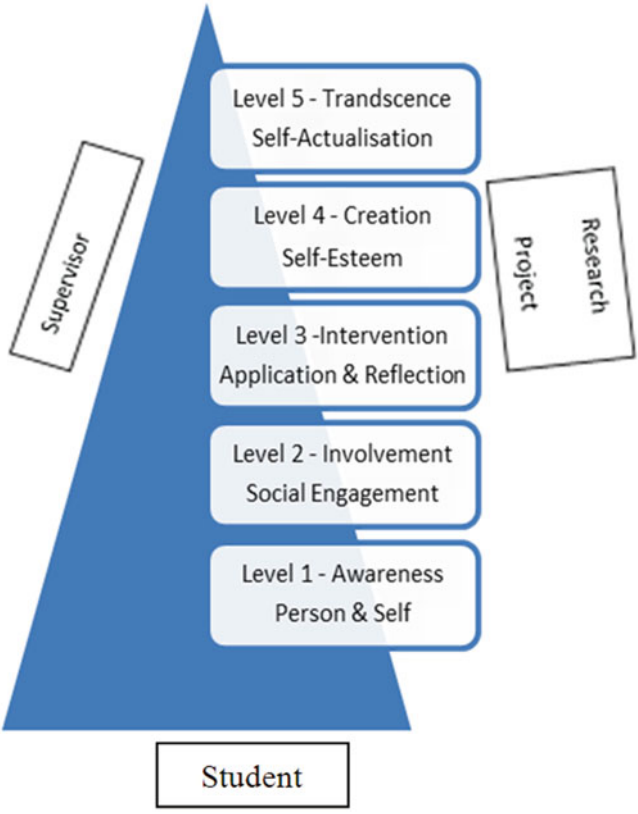

Fig. 3 Levels of autonomy and processes in supervision

adapt their goals. At Level 4, they can create and modify their learning goals, whilst students at Level 5 (when they complete their task – i.e. thesis) can transcend from students to becoming teachers to others. Maslow (1970) describes this self-actualisation level as the desire to accomplish everything that one can. In the context of postgraduate supervision, PhD candidates can move from the novice researcher to becoming full-fledged researchers. Based on each student's level of autonomy, the supervisor can then decide what kind of help and mentoring is needed. Keeping in line with instilling a sense of ownership and autonomy among students, supervisors can choose to be a 'hands-on' or 'hands-off' supervisor put forward by Gurr's model (2001) or opt for Anderson's (1988) supervision model which is characterised by two main dimensions of 'direct'/'indirect' and an 'active'/'passive' dimension. Supervisors need to understand that when helping students on this

journey of self-discovery, the holistic education approach may require a range of teaching and learning practices that address multiple ways of thinking and knowing. More importantly, supervisors must be generous enough to allow space for diversity of expression and create opportunities for both personal and collective choice, action and responsibility.

6 Concluding Remarks

It is important to understand that when students embark on a research study such as a PhD programme, supervisors have to help facilitate the transitional period, i.e. adapting to the new culture of research and becoming a member of the academic discipline. In this process of enculturalisation, effective supervision requires supervisors to adopt a holistic outlook where the supervisor not only provides pastoral care but also helps the student find an identity and purpose by connecting to the communities of learners. As proposed in the holistic approach for postgraduate supervision, the effective supervisor can move flexibly between the various levels and modes. According to Pearson and Kayrooz (2004) cited in Delany, this adaptive mode switching can occur even within the space of a single meeting, and supervisors need to be there to provide the support, educational tasks and activities which include progressing the candidature, coaching the research project and sponsoring student participation in academic practice. As such the faculty and the institution need to advance the scholarship of teaching and learning in the 'turbulent environment' of postgraduate supervision by developing effective supervisory skills as a form part of ongoing continuous professional development (CPD) for academics and facilitate the sharing of best practice across institutions. Whilst the findings of this study may not be generalisable to all supervision contexts in Malaysia, the suggested holistic approach has the potential to raise awareness among supervisors towards effective supervisory practices. Henceforth, there is a need for more empirical evidence and further research to evaluate the effectiveness of a holistic approach.

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Conceptualising a Framework in Evaluating a Collaboration Model Using Technology for Developing Lesson Contents

Vikneswaran Nair, Justin Nathan, and Tarana G. Ramchand

Abstract Technology adoption in collaborative teaching is a subject area that has been gaining popularity among researchers lately. The factors that influence the acceptance in using collaboration technology to perform a task are closely related to the factors that have the potential to influence adoption. These acceptances to use technology correspond directly to core underpinnings of perceived usefulness, perceived ease of use, and attitude towards using technology, respectively. Hence, this study aims to use the Technology Acceptance Model (TAM) as the basis to test the community acceptance of *TEGpedia* collaboration model for developing lesson contents. *TEGpedia* collaboration model is a proposed model that can be adopted by institution of higher learning in managing lesson plan and materials more efficiently by collaborating effectively.

Keywords Collaborative teaching • Technology Acceptance Model • Wikipedia

1 Introduction

It is the goal of every academics in helping each student to reach their full intellectual potential. Hence, all academics fundamentally must be a good teacher. Nonetheless, in this current fast-paced knowledge era, academics may find the whole process of developing the teaching curriculum and the teaching contents overwhelming especially if information is changing rapidly. Thus, academics need

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to learn how to engage in collaborative teaching that will allow them to leverage on teamwork to produce good teaching materials. Research on collaborative technology has been in existence for more than two decades (Olson and Olson 1991; Dennis et al. 1988, 2001; DeSanctis and Gallupe 1987; Eden and Ackerman 2001; Nunamaker et al. 1991; Zigurs and Buckland 1998; Dennis and Gallupe 1993; Rhoads et al. 2014; Wallace and Sheetz 2014).

There are several levels of collaboration. For some academics, collaboration may look like these scenarios:

- Scene 1: The history lecturer A and language lecturer B teach next door to each other. In the staff room, lecturer A announces that she is teaching the Malacca Sultanate History. Lecturer B is thrilled to hear this because he is planning to have his students read a poem on Malacca before colonisation. Both lecturers agree to coordinate their lessons so that students can have what they are learning about in the Malacca History supported by a classic poem found in the local Malay literature book. Hence, this serendipitous meeting of two lecturers can be an example of collaboration.
- Scene 2: If only lecturer A and lecturer B could check their calendars and begin scheduling weekly meetings, they could create a true collaborative relationship. Together, they would begin to construct fully structured bridges between their curriculums that would not only bring them deep professional satisfaction, but more importantly they would enrich the learning experiences of their students.

With collaboration, each lecturer can bring their respective curriculum guides to their first meeting. Together, these lecturers begin to see how cross curricular teaching allows them to see the deep and authentic connections between their curriculums. Very quickly, they pull their once isolated standards into a web which captures the attention and interest of their students. These lecturers define collaboration as a deep partnership between educators in which curriculum is studied and understood by teams of lecturers across curriculum. When an understanding of the connections between curriculums is brought into their classrooms, the links between knowledge disciplines will become heavily travelled highways. Their students will be the beneficiaries of this journey to the pinnacle of teaching.

As these model lecturers continue to work together, their collaboration will gain depth and complexity. They will know their partner's curriculum, as well as they know their own. They cannot fail to notice the transformative power of their students' growing interest and deepening knowledge. Their students are no longer passive and almost lifeless classroom occupants. They have become excited learners. Hence, teachers who work collaboratively begin to experience the true pleasure of teaching. They are no longer isolated, but more importantly, they can see their students growing towards the end goal of education: independent, critical thinking.

No teacher is an island. As more and more teachers and lecturers comprehend this and move to an advanced and more profound definition of collaboration, they will make an essential and positive change in their own lives as an educator and the lives of their students. As a result, the change will produce better teaching and better learning.

Thus, understanding technology acceptance, which is one of the most established streams of information systems research, is critical in the success of the collaboration model (Venkatesh et al. 2003; Vessey et al. 2002). People in general accept technology because they assume it will be useful in improving the effectiveness, efficiency, and/or personal satisfaction of performing some task. Thus, the factors that have the potential to influence adoption can be ascertained.

Hence, this study aims to use the Technology Acceptance Model (TAM) as the basis to test the academic community in a well-established private university in Malaysia in the acceptance of *TEGpedia* collaboration model for developing lesson contents.

2 Some of the Types of the Traditional Method in Collaboration in Teaching

Collaboration in teaching involves educators planning and working together to efficiently produce learning materials to the students (Dedea 1996; Persico et al. 2014). In the past, collaborative teaching can take many forms, which include the following:

(a) Joint planning (teaching teams collaborate in planning and evaluating lessons or units of work for whole class) (Nilsson and Driel 2010)
(b) Small group work (teaching teams plan a brief activity for a small group. One team member works with the small group, while the other takes responsibility for the whole class) (Roger and David 1988)
(c) Parallel teaching (the class is divided into groups with specific needs. Each member of the team takes responsibility for one group, using the same topic) (Thousand et al. 2006)
(d) Support teaching (one team member assists targeted learners with normal classroom activities, while the other teaches the whole class) (Presseisen 2008)
(e) Team teaching (ESL teacher and teaching team share responsibility for planning, teaching, assessing and evaluating mainstream programmes. They jointly plan curriculum content, lesson methodology and classroom organisation) (Cohen 1981)
(f) Tutors in class (work with individual students at risk during normal class hours. This is planned in consultation with the class teacher and the school coordinator) (Calderheada 1988)

Nonetheless, all forms of collaborative teaching will include assessment of learner performance/learning outcomes as well as evaluation of the unit of work/lesson sequence.

3 About *TEGpedia*

"*TEGpedia*" or, in full, "Taylor's Education Group pedia" is a platform that allows user to publish, retrieve and amend their information collaboratively and digitally using a private domain that is relevant to the organisation. There are many platforms that can be used to host this collaborative teaching approach. *TEGpedia* uses the same approach as Wikipedia, which is a free encyclopaedia, written collaboratively by the people who use it. It is a special type of website designed to make collaboration easy, called a wiki. Users can constantly improve Wikipedia by making constant to the information.

The main criteria used in the *TEGpedia* approach are the application must be collaboration friendly, subjects or topics chosen for collaboration must change frequently and require latest update for classroom discussion, the subjects chosen should be taught by more than one lecturer, and/or the topics may be taught by more than one subject.

The usage scenario for the collaboration varies from one contributor to another and one user to another. The philosophy behind the collaboration must be agreed upon by all parties involved in the collaboration. The collaboration subject area will be topic based. This will ensure that the collaboration will be more effective. The moderation of the discussion materials in the topic can be done by moderator or via peer moderation.

In the traditional or current approach, contents in most subject or topics in a lesson are managed in silos as indicated in Fig. 1. All contents created by all lecturers teaching a subject work in isolation from one another. Although lecturer A to lecturer H are teaching some common subject, the contents are developed separately as they are all teaching in various programmes in the university.

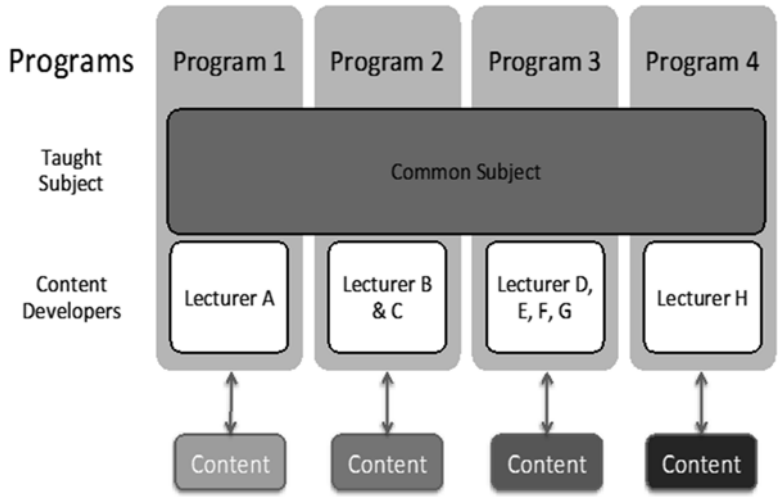


Fig. 1 Contents created in silo

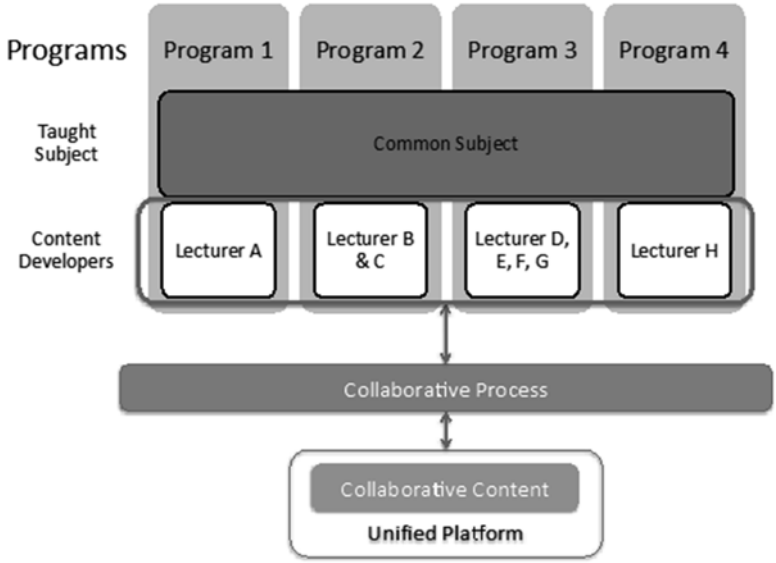
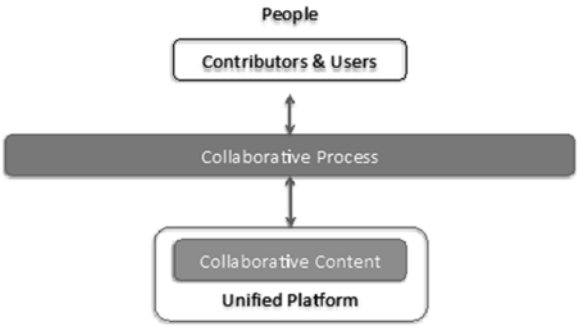


Fig. 2 Collaborative content creating

Fig. 3 Overview of the collaborative content model



Instead, by using the approach of collaborative content creation (see Fig. 2), the contents are developed more unified.

Thus, in a collaborative content model, the collaborative process will bridge efficiently and effectively the users/contributors with the contents parked in a unified platform. This is outlined in Fig. 3.

The workflow of the collaboration model is outlined in Fig. 4. Hence, there are two approaches in how collaboration can take place – as a contributor to the information and as a user in locating the information and using them. Generally, there are four phases of how the collaboration will take place – identifying the topic/creating the topic, moderating the information, adding the contents, and finally announcing to all peers.

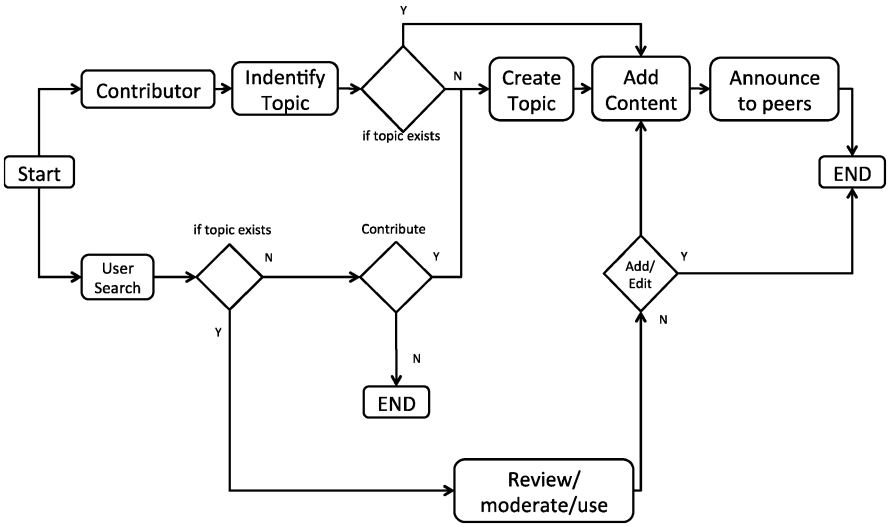


Fig. 4 Workflow of the collaboration process

4 Developing the Framework

This study basically is attempting to address similar key research question by Dennis et al. (2003) which is:

Why do academics choose to accept, adopt, adapt and use collaboration technology?

Using the Technology Acceptance Model (TAM) developed in the 1980s (Davis 1989; Davis et al. 1989), the collaboration model developed using Microsoft SharePoint for *TEGpedia* can be evaluated for the acceptance of the users. TAM incorporates four (4) key predictors of intention to use technology (Venkatesh and Davis 2000; Venkatesh et al 2003). They include (1) perceived usefulness, (2) perceived ease of use, (3) attitude towards using technology, and (4) subjective norm. The intention to use the technology will in turn predict the technology use and the acceptance as shown in Fig. 5.

As described by Dennis et al. (2003), the factors that influence the acceptance in using collaboration technology to perform a task are closely related to the factors that have the potential to influence adoption. This is because perceived usefulness is the extent to which an individual recognises a net gain in accepting to use the technology.

These acceptances in using the technology correspond directly to core underpinnings of perceived usefulness, perceived ease of use, and attitude towards using technology, respectively, thus making TAM particularly suitable as the basis for the model development of this *TEGpedia* project.

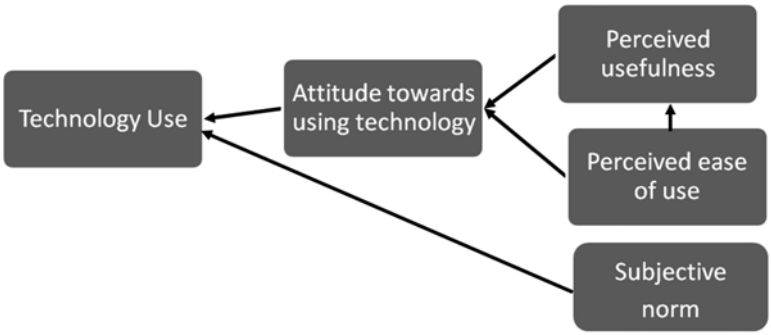


Fig. 5 Technology Acceptance Model

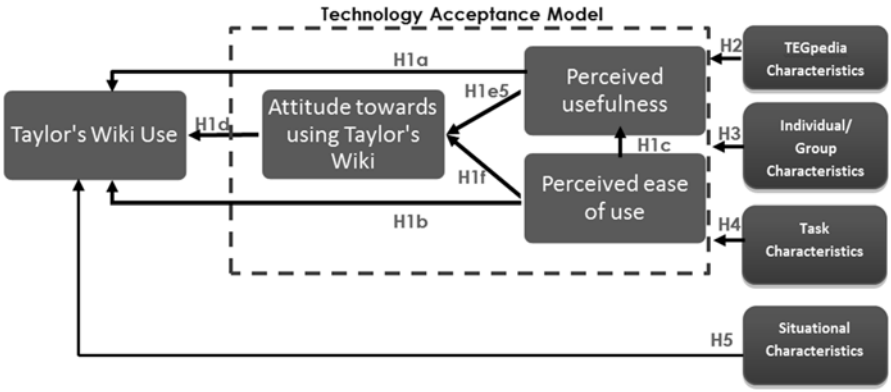


Fig. 6 Research model for the study

Subjective norm is a situational variable since collaboration technology use will not only depend on the influence of others but also on the critical mass of users. Subjective norm is the extent to which an individual believes important others think he or she should use the technology in question (Venkatesh and Davis 2000). Social influence in technology acceptance can be a moderating variable (Venkatesh and Brown 2001) in predicting the acceptance of technology adoption. This includes organisational mandate (Venkatesh and Davis 2000), gender (Venkatesh and Morris 2000), and attitude or characteristics (Taylor and Todd 1995; Davis et al. 1989). Nonetheless, over the years, numerous researches (Karahanna et al. 2006; Venkatesh and Davis 2000; Venkatesh and Morris 2000; Venkatesh et al. 2003) have shown that it has consistently been found to be of limited importance. Subjective norm can also include the strategic direction of the organisation in adopting TAM.

Hence for this study, a modified TAM developed by Dennis et al. (2003) (see Fig. 6) can be used to evaluate the acceptance of *TEGpedia* collaboration model for developing lesson contents.

4.1 TAM Construct

Thus, from the framework outlined in Fig. 6, the following hypothesis can be tested for the TAM construct:

(a) H1a: Perceived usefulness will positively influence *TEGpedia* use.
(b) H1b: Perceived ease of use will positively influence *TEGpedia* use.
(c) H1c: Perceived ease of use will positively influence perceived usefulness.
(d) H1d: Attitude towards using collaboration technology will positively influence *TEGpedia* use.
(e) H1e: Perceived usefulness will positively influence attitude towards using *TEGpedia*.
(f) H1f: Perceived ease of use will positively influence attitude towards using *TEGpedia*.

Measurement indicators for these constructs include as indicated in Table 1.

4.2 Characteristics Construct

Figure 6 has also outlined hypothesis 2 as the following:

- H2: There is a relationship between *TEGpedia* characteristics and the three TAM constructs.

Collaboration technologies like *TEGpedia* provide a variety of capabilities that can be used in different ways by different groups or individuals with different outcomes. Hence, there is a need to analyse characteristics as used and experienced by the users (not the available technology characteristics but the technology characteristics experiences by the users). Four major constructs that will affect the *TEGpedia* characteristics include (1) social presence, (2) media richness, (3) immediacy of communication, and (4) concurrency.

For social presence, users are able to convey the psychological impression using the technology, e.g., able to transmit nonword cues (voice inflection) and nonverbal cues (gestures and facial expression). Thus, the following hypothesis can be studied:

- H2a: Social presence will positively influence perceived usefulness.
- H2b: Social presence will positively influence ease of use.
- H2c: Social presence will positively influence attitude towards using *TEGpedia*.

For Media richness, the ability for the medium to transmit multiple cues and understand ambiguous messages can be ascertained. Thus, the following hypothesis can be studied:

- H2d: Media richness will positively influence perceived usefulness.
- H2e: Media richness will positively influence ease of use.
- H2f: Media richness will positively influence attitude towards using *TEGpedia*.

Table 1 Measurement indicators for TAM construct

Construct	Measurement indicators (items)
Usefulness of *TEGpedia*	I find *TEGpedia* to be useful for teaching and learning
	Using *TEGpedia* enables me to accomplish my goals in teaching and learning
	Using *TEGpedia* increases my productivity (in terms of time and effectiveness)
	I am able to discuss the lesson materials with my peers
Ease of use of *TEGpedia*	I find *TEGpedia* to be easy to use
	Using *TEGpedia* does not require a lot of mental effort
	I find it easy to use my smart mobile phone and other tablet devices to access TEGpedia
	The application is well guided with sufficient help manual
	The application is user-friendly and easy to use
	The application allows the user to upload media (files/documents/ multimedia) easily
	The sequence of data entry is not controlled which makes it flexible for the user to contribute
Usefulness of *TEGpedia*	I find *TEGpedia* to be easy to use
	Using *TEGpedia* does not require a lot of mental effort
	I find it easy to use my smart mobile phone and other tablet devices to access TEGpedia
	The application is well guided with sufficient help manual
	The application is user-friendly and easy to use
	The application allows the user to upload media (files/documents/ multimedia) easily
	The sequence of data entry is not controlled which makes it flexible for the user to contribute
Attitude towards using *TEGpedia*	Using *TEGpedia* as a collaborative tool is for teaching and learning is a good
	Working with *TEGpedia* is fun
	I like using *TEGpedia* for teaching and learning
Use of *TEGpedia*	I use *TEGpedia* effectively for teaching and learning
	I spend sufficient time in using *TEGpedia* for teaching and learning purpose
	I am a frequent user of collaborative technology for teaching and learning
	I consider myself to be a heavy user of collaborative technology for teaching and learning

For immediacy of communication, the technology enables the users to quickly communicate with others. This relationship can be determined using the following hypothesis:

- H2g: Immediacy of communication will positively influence perceived usefulness.

- H2h: Immediacy of communication will positively influence ease of use.
- H2i: Immediacy of communication will positively influence attitude towards using *TEGpedia*.

Finally, for concurrency, users are able to perform other tasks concurrently while using the technology. Thus, the following hypothesis can be studied:

- H2j: Concurrency will positively influence perceived usefulness.
- H2k: Concurrency will positively influence ease of use.
- H2l: Concurrency will positively influence attitude towards using *TEGpedia*.

Measurement indicators for each of these characteristics constructs are indicated in Table 1.

4.3 Individual/Group Characteristics Construct

Next, as per Fig. 6, the Individual/Group Characteristics construct can also be analysed with the following hypothesis:

- H3: There is a relationship between Individual/Group Characteristics and the three TAM constructs.

Different individual or groups have different needs. Based on demographic analysis, the use of *TEGpedia* can be understood, but designing technology to meet the needs of specific user characteristics can be difficult.

Hence, for *TEGpedia*, in addition to the standard demographic analysis, the influence of the following factors is important: technology expertise, self-efficacy, and familiarity with others.

Technology expertise is the ability to use a specific technology to play a role in the selection and use of a technology and in one's perceptions and attitudes towards it. When expertise grows, the technology becomes easier to use. Hence, the following hypothesis can be developed:

- H3a: Technology expertise will positively influence perceived usefulness.
- H3b: Technology expertise will positively influence ease of use.
- H3c: Technology expertise will positively influence attitude towards using *TEGpedia*.

For self-efficacy, individuals with greater technology-related self-efficacy normally perceived technologies to be easier to use. Hence, the hypothesis can be the following:

- H3d: Self-efficacy will positively influence perceived usefulness.
- H3e: Self-efficacy will positively influence ease of use.
- H3f: Self-efficacy will positively influence attitude towards using *TEGpedia*.

For the construct familiarity with others, as individuals work together, they gradually develop an understanding of each other and jointly develop a set of norms

and expectations around the use of technology. Hence, familiarity with the other group members will influence how the individual view the technology. Hence, the following hypothesis is proposed:

- H3g: Familiarity with others will positively influence perceived usefulness.
- H3h: Familiarity with others will positively influence ease of use.
- H3i: Familiarity with others will positively influence attitude towards using *TEGpedia*.

Other demographic analysis attributes can also be used to measure Individual/Group Characteristics construct.

Table 2 shows all the measurement indicators (items) for the three constructs identified for Individual/Group Characteristics (Table 3).

4.4 Task Characteristics Construct

The framework in Fig. 6 has further outlined the Task Characteristics as one of the constructs that will determine the acceptance level of new technology, with the following hypothesis:

- H4: There is a relationship between Task Characteristics and the three TAM constructs.

Table 2 Measurement indicators for *TEGpedia* characteristics construct

Construct	Measurement indicators (items)
Social presence	Using *TEGpedia* to collaborate with others creates a warm environment for communication
	Using *TEGpedia* to interact with others creates a sociable environment for teaching and learning
	Using *TEGpedia* to interact with others creates a personal environment for teaching and learning
Media richness	When we disagree, using *TEGpedia* as the collaborative technology makes it easy for us (my peer and I) to come to agreement
	When we disagree, using *TEGpedia* helps my peers and I to come to a common position
	I can easily communicate ideas for teaching and learning using *TEGpedia*
Immediacy of communication	Using *TEGpedia* enable me to quickly communicate my teaching and learning materials with my peers
	When I post my work in TEGpedia, I get my peers responding or interacting with me on the posting quickly
	Similarly, when someone sends a posting in the TEGpedia, I try to respond immediately
Concurrency	I can easily use *TEGpedia* or multitask while working on my subject matter in teaching and learning
	I can use *TEGpedia* while performing another task
	I can easily work on *TEGpedia* while participating in other activities

Table 3 Measurement indicators for *TEGpedia* Individual/Group Characteristics construct

Construct	Measurement indicators (items)
Technology expertise and self-efficacy	I can complete a task using *TEGpedia* even if there was no one around to tell me what to do
	I can complete a task using *TEGpedia* even if there was not a lot of time to complete the task
	I could complete a task if I had just the built-in help facility for assistance
Familiarity with others	I feel comfortable discussing teaching and learning issues with my peers
	I feel comfortable using the unconventional way of collaborating in teaching and learning with my peers
	Overall, I feel that I know my teaching and learning peers well
Demographic attributes	Age
	Gender
	Citizenship
	Years in service

There are many ways to examine tasks. The simplest way is to examine the utilisation of the technology. This can be done via the system-generated tracking of *TEGpedia* using Microsoft SharePoint. In addition to that, the mobility of the user to which the task performed using *TEGpedia* by that user can be done efficiently even when he or she is away from his or her work environment. Hence, the following hypothesis can be developed:

- H4a: Mobility will positively influence perceived usefulness.
- H4b: Mobility will positively influence ease of use.
- H4c: Mobility will positively influence attitude towards using *TEGpedia*.

For these hypotheses, the following indicators/items can be used:

- I am often away from a computer.
- I do not have much time to use collaborative technology during the day.
- I do not have much time to talk to my peers during the day.

Mobility can also be measured using the following data extracted from the system itself in Microsoft SharePoint:

(a) Traffic

- Number of Page Views
- Number of Daily Unique Visitors
- Top Pages
- Top Visitors
- Top Browsers

(b) Search

- Number of Queries
- Top Queries
- Failed Queries

(c) Inventory

- Storage Usage

4.5 Situational Characteristics Construct

Finally, for the last construct, Situational Characteristics, the following hypothesis can be studied:

- H5: Situational Characteristics will positively influence *TEGpedia* use.

The use of *TEGpedia* will not only depend on the influence of others but also on the critical mass of users and also other situations that impact the decision making. This may include organisational strategic direction or mandate, management decision, cost and market trend. The following item can be used to measure the Situational Characteristics:

- I do not have much time to talk to my peers during the day.

5 Conclusion and Significance of the Study

In conclusion, a collaboration model like the *TEGpedia* will have many advantages to further improve on the teaching approach. The outcomes of the collaboration will result in sharing of knowledge/academic content in selected subject area, collaboration/scaffolding of knowledge/academic content, efficient management of time in sourcing for good teaching contents, retention of knowledge in terms of the institution's intellectual property, and a "Pay-it-Forward" approach whereby the collaboration is the contribution for others to use. With diverse types of tools and applications available to support collaborative teaching, teachers can ascertain the most accepted approach in supporting the specific teaching and learning goals.

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Part V
Other Areas

The Relationship Between Students' Malaysian Certificate of Education Forecast Results and Academic Performance in Business Studies at Pre-university

Sok Fun Chin and Ooi Wei Lim

Abstract In Malaysia, many Malaysian Certificate of Education (MCE or SPM in local terms) students use their SPM forecast to choose their subject combination when they enroll at Pre-university level program in a private institution. Previous research has shown that secondary students with high levels of English proficiency and exposure to challenging Mathematics questions can improve their future performance in their subject. The purpose of this study is to establish the relationship between students' SPM forecast results and academic performance of the same students in Business Studies at Pre-university level. A total of 97 respondents were involved in this study. The grades awarded in the SPM forecast were collected and compared with their academic performance in Pre-university Accounting or Economics or both in the first semester. The data was analyzed using Spearman's rank-order correlation. The results indicated the following: (1) SPM forecast results for English Language, Modern and Additional Mathematics, Chemistry, Physics, History, and Moral Studies exhibited a significant positive relationship with Pre-university Accounting or Economics or both, and (2) SPM forecast results for Accounting and Foundation in Economics do not correlate with Pre-university Accounting or Economics or both. Among the 14 subjects from the SPM forecast, seven (7) revealed significant relationships with Pre-university Business subjects measured in Accounting or Economics or both.

Keywords SPM forecast • Pre-university • Business studies

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1 Introduction

This Pre-university program is a popular program administered by an external examination board and is a pathway for international students to apply for universities in Australia. SPM candidates can use forecast results to apply to and enroll in this program at the end of a calendar year. The Pre-university program starts in January the following year, and the SPM official results, when released in March, will be used to confirm the enrollment if the candidates fulfill the minimum entry requirements for the program. Hence, at the time of the release of the SPM results, the program would be into its third month, but subjects chosen at the time of enrollment will not change even though the students' actual performance in the SPM could vary from the forecast results. In view of the increasing demands of the employment market and in the search for good job prospects, Business Studies has become a popular choice for post-SPM students. According to Cambridge University Reporter (2003), academic performance of students is commonly measured using examination performance; hence, the forecast results guide SPM candidates to decide on the choices of subjects to study at Pre-university level. It is a belief that candidates who are good in Mathematics and English will have an advantage when pursuing a business course; hence, those achieving good grades in the SPM forecast for Mathematics and English may be driven to select Business subjects at Pre-university level and thereon pursue Business Studies at university level. Thus, the central question is whether those who choose Business subjects at Pre-university due to good results in particular subjects in the SPM forecast will excel in their studies? This leads to the main research objective of this study:

- To establish the relationship between students' SPM forecast results and academic performance of Business Studies students at Pre-university level.

1.1 Contribution of This Study

Good academic performance of Pre-university students is vital for entrance into good universities. The Universities Admissions Center (2006) reported that, in Australia, most tertiary courses use students' overall academic performance as the best predictor of success in tertiary studies. It is important for post-SPM candidates to make the right choice for their subject combination at Pre-university. The results of this study, if found significant, will provide useful information to aid the SPM candidates in their selection of this subject combination. It will also aid institutions of higher education offering the Pre-university program to identify potentially good Business students for their programs.

1.2 Literature Review and Hypothesis Testing

The theoretical complexity and problem-solving demands of Mathematics require rational, interpretative, and strategic skills of students (Schaap and Luwes 2013). Students who experience difficulty solving Mathematics questions can improve their self-regulatory skills, which are an important element to high attainment in their academic performance (Matthews 2000). Inadequate knowledge in Mathematics at school will result in poor results in the university level natural sciences (Schaap and Luwes 2013). Adelman's (1999) study on students in the United States found that the number and intensity of Mathematics subjects taken in high school would contribute to success in higher education. This study is supported by Matthews (2000) that experience in high-order thinking Mathematics questions in secondary school may benefit students in postsecondary education. Noor Azina Ismail and Azmah Othman (2006) of the University of Malaya found that academic results of students in the Faculty of Business and Accountancy are influenced by their SPM Mathematics results. However, this outcome is not shown in students from the Faculty of Arts and Social Sciences and the Faculty of Economics and Administration. Hence, the previous study is inconclusive that students with good results in SPM Mathematics may excel in Business Studies which are offered in both Accountancy and Economics courses. Thus, there has been a lack of research on using SPM forecast results to predict academic performance in Business Studies. This study would like to explore the relationship between the SPM forecast Mathematics results and academic performance of Business students at Pre-university, since most such students will usually choose subject combinations involving both Accounting and Economics, thus forming the first hypothesis:

- $H1_a$: There is a positive relationship between the SPM forecast grade in Additional Mathematics and Modern Mathematics and academic performance in Accounting or Economics or both at Pre-university.

Studies on the relationship between the sciences and academic performance have been carried out in the past. The study of Science subjects comprises the learning of concepts, established principles, laws and theories, and also substantial activity-oriented laboratory works (Oluwatosin and Bamidele 2014). Derek (2007) suggests that performing laboratory tasks may enhance cognitive growth, positive attitude, as well as social relationship with peers. Rosli et al. (2012) conducted a cross-sectional study on the second year undergraduates of the Faculty of Health Sciences and Faculty of Medicine, Universiti Kebangsaan Malaysia, and found that those with higher self-esteem tend to have better academic performance compared to those with lower self-esteem. Also, students with good self-concept would be motivated to make every effort for success in the face of any difficulty, and this will lead to good performance in Science subjects (Oluwatosin and Bamidele 2014). These characteristics greatly affects academic performance in comparison to other contributing factors including stress and body image (Rosli et al. 2012; Oluwatosin and Bamidele 2014; Suárez-Álvarez et al. 2014). Ervina Alfan and Md Nor Othman

(2005) tried to determine the factors influencing undergraduate students' performance in the Faculty of Business and Accountancy, University of Malaya. The results show that while there is significant correlation between students' results in SPM Physics and students' cumulative grade point average (CGPA) scores in the final semester, no significant relationship exists between results in SPM Chemistry, Biology, and Science and CGPA. Kam and Ch'ng's (2009) study on students from INTI International College Penang found that students with good results in Physics, Chemistry, and Biology achieved good performance in the Diploma in Electrical and Electronic Engineering Program. Another research done by Ch'ng et al. (2011) on the students from the same college exhibited significant correlation between SPM Physics, Chemistry, and Biology grades and performance in Thinking Skills, an A-Level subject. There is a lack of study examining the effect of Sciences taken at SPM and students' academic performance at Pre-university level, which prompts the second hypothesis:

- $H1_b$: There is a positive relationship between the SPM forecast grade in Physics, Chemistry, Biology, and Science and academic performance in Accounting or Economics or both at Pre-university.

With more Malaysian students enrolling in universities in English-speaking countries such as Australia, English language proficiency (ELP) has become critical for academic success. A study by Abe et al. (2014) on 80 senior secondary II students in Nigeria found that students who apply goal-setting skills helped to refine and transform their thoughts, and this led to better performance in English language. In the process of learning English, a student developed interest, self-motivation, hard work, persistence, and being focused; hence, this leads to better academic performance (Abe et al. 2014). According to Davies (1988), although it may not be necessary that English is the criterion contributing to good performance in subjects at tertiary level, research carried out by Kong et al. (2012) on two cohorts of middle-school English learners found that English language proficiency may be an important predictor of future academic achievement. This research would like to explore the relationship between the SPM forecast grade in English and academic performance in Business subjects at Pre-university, thus developing the hypothesis:

- $H1_c$: There is a positive relationship that exists between students' SPM forecast grades in English and their academic performance in Accounting or Economics or both at Pre-university.

While students' career interest choices have significant effect on their performance in Financial Accounting in senior secondary schools in Nigeria (Adeleke et al. 2013), secondary school students in Malaysia have problems with uncoordinated learning experiences and limited time to learn the Commerce subject (Awi 2008). Cutting Edge Media approaches such as LinkedIn, Facebook, Twitter, Second Life, and Blogs offer new learning experiences and help to overcome the problem of time constraint faced by Commerce students (Wankel 2010).

Ervina Alfan and Md Nor Othman (2005) conducted research on undergraduates at the Faculty of Business and Accountancy in the University of Malaya. The study

found that Foundation Studies in Economics and Commerce undertaken at SPM level are crucial in helping students who study both Business and Accounting programs, though it is very loosely related to the students' final CGPA in the final semester. Hence, this research would like to explore the relationship between students' SPM forecast grades in Accounting or Foundation in Economics and their academic performance in Business subjects at Pre-university level, thus prompting the hypothesis:

- $H1_d$: There is positive relationship between students' SPM forecast grades in Accounting or Foundation in Economics and their academic performance in Accounting or Economics or both at Pre-university.

2 Methodology

In this study, respondent data were collected from 97 Business students who enrolled for the 2014 January intake of a Pre-university program at a private institution. Cluster sampling was chosen due to the homogeneous groupings of the population. The sample size was determined based on the table developed by Krejcie and Morgan (1970). Business students are those who enroll for either Accounting or Economics or both. Table 1 lists the respondent's demographic characteristics, inclusive of their mother tongue and types of school attended at secondary level.

Respondents who joined the program on the first day of the semester were asked to complete, under supervision, a survey form to record their SPM forecast results (in grades). The grades were then compared with their actual SPM results to ensure reliability of the figures at the time of response. The SPM forecast grades were converted into ordinal data to ease data analysis. The following table shows the conversion (Table 2).

Table 1 Mother tongue and types of secondary school attended

Secondary school and mother tongue					
	Malay	Chinese	English	Others	Total
Public school	0	30	29	5	64
	0.0 %	46.9 %	45.3 %	7.8 %	100.0 %
International school	0	5	5	1	11
	0.0 %	45.5 %	45.5 %	9.1 %	100.0 %
Home school	0	0	1	0	1
	0.0 %	0.0 %	100.0 %	0.0 %	100.0 %
Chinese independent school	0	4	0	0	4
	0.0 %	100.0 %	0.0 %	0.0 %	100.0 %
Private school	1	8	8	0	17
	5.9 %	47.1 %	47.1 %	0.0 %	100.0 %
Total	1	47	43	6	97
	1.0 %	48.5 %	44.3 %	6.2 %	100.0 %

Table 2 Conversion of SPM forecast grades into rank order

SPM forecast grading	Rank order
A+	9
A	8
A−	7
B+	6
B	5
C+	4
C	3
D	2
E	1
F	0

The results achieved in the Accounting and Economics subjects in the first semester of the Pre-university level were collected. If the respondent takes both subjects, then the average results for the two subjects were used. The data were analyzed using the Statistical Package for the Social Sciences (SPSS). Since, in nonparametric tests involving ordinal data, the test for normality is not required, the data are analyzed using Spearman's rank-order correlation, a nonparametric version of the Pearson product-moment correlation (Chua 2006).

3 Results and Discussion

The results of the analysis are summarized in Table 3.

The Spearman rho indicated that SPM forecast Modern Mathematics and Additional Mathematics have a significant positive relationship with Pre-university level Accounting or Economics or both; hence, $H1_a$ is accepted. The finding supports studies by Schaap and Luwes (2013), Matthews (2000) and Adelman (1999). Students who perform well in SPM forecast Mathematics demonstrated rational, interpretative, and strategic skills, thus helping them to succeed in academic performance at Pre-university level.

Of the four sciences, only SPM forecast Physics and Chemistry show a significant positive relationship with Pre-university academic performance in Accounting or Economics or both, thus rejecting $H1_b$. This study supports studies by Kam and Ch'ng (2009) and Ch'ng et al. (2011) who suggest that good performance in Physics and Chemistry at secondary school is positively related to future academic performance. Chemistry and Physics are universal, dynamic, and practical-oriented subjects, and students with higher-level self-concept would be motivated to make every effort for success in the face of any difficulty; these would lead to better performance at Pre-university level (Oluwatosin and Bamidele 2014). SPM forecast Biology and Science do not exhibit significant relationship with Pre-university academic performance in Accounting or Economics or both. Hence, this finding supports studies by Ervina and Md Nor Othman, 2005. However, this finding does

Table 3 Correlations between forecast SPM subjects and Pre-university Accounting or Economics measured in Spearman rho

SPM forecast subjects	Pre-university Accounting or Economics or both
Modern Mathematics	.219*
Additional Mathematics	.275*
Accounting	.003
Foundation in Economics	.390
Science	.269
Physics	.276*
Chemistry	.306*
Biology	.133
Moral	.255*
Arts	−.894
History	.227*
English Language	.244*
Chinese Language	−2.51
Malay Language	.172

*Correlation is significant at the 0.05 level (2-tailed)

not support researches by Ervina and Md Nor Othman, 2005, who suggest that students' SPM Chemistry is not associated with future academic performance.

Biology is a subject that is synergic with many other disciplines such as Physics, Chemistry, Medicine, Pharmacy, Geography, and Geology (Adodo and Oyeniyi 2013). According to the Ministry of Education Malaysia, students who sit for SPM Biology need to provide evidence that they possess scientific and thinking skills and are able to apply knowledge and skills in a creative and critical manner to solve problems on Biology-related issues. With these inbuilt demands of the syllabus, students may not perform well in SPM forecast Biology even though they could succeed at Pre-university level.

Malaysian students upon completion of lower secondary education have the opportunity to pursue 2 years of studies in upper secondary (Form 4–Form 5). Students who are academically inclined can choose between the two main streams, i.e., Arts stream or Science stream. Science stream students will learn Chemistry, Biology, and Physics for Science subjects. Arts stream students will take Science and any other non-Science subject such as Accounting or Economics (Ministry of Education Malaysia 2014). In view of the wider career option available for Science stream, better students are prone to choose the Science stream, while only a handful would be in the Arts stream. Students who undertake Science in SPM are, in general, Arts stream students whose performance is less inclined to compare well with those who take Chemistry, Biology, and Physics. This study revealed that Arts stream students who perform well in SPM forecast Science may not achieve good results in Pre-university level Accounting or Economics or both.

English Language forecast at SPM level is the only language subject which positively correlates with Pre-university Accounting or Economics or both; hence, $H1_c$ is accepted. This finding supports previous researches that English language proficiency will give an advantage to students who pursue further studies in courses conducted in English (Abe et al. 2014; Kong et al. 2012; Davies 1988). Language proficiency is a fundamental skill needed to participate effectively in class discussions and perform note-taking, these facilitate academic development.

SPM forecast for Foundation in Economics and Accounting does not exhibit a significant relationship with the Pre-university Accounting or Economics or both; therefore $H1_d$ is not supported. As students whose performance is lower are less inclined to choose Arts stream in upper secondary, they enroll for Foundation in Economics and Accounting in SPM. Furthermore, the uncoordinated learning experience and limited time to learn the Commerce subject (Awi 2008) in upper secondary do not promote a positive learning environment. Thus, the students could not acquire the skills to demonstrate perceptive, logical, and critical interpretation of information as required by the Pre-university Accounting or Economics or both.

Other findings include SPM History and Moral Studies displaying a significant relationship with the Pre-university Business subjects. Among the 14 subjects in SPM forecast, seven (7) revealed significant relationships with Pre-university Business subjects measured in Accounting or Economics or both.

4 Conclusion

The purpose of this study is to establish the relationship between students' SPM forecast results and academic performance of Business Studies students at Pre-university. From the above results, students who achieved better results in SPM forecast English Language, Physics, Chemistry, Modern Mathematics, and Additional Mathematics tend to perform better in Pre-university Accounting or Economics or both. This can be attributable to the inherent demand of Pre-university Accounting and Economics which require students to communicate effectively using highly appropriate technical jargon. Moreover, the ability to demonstrate perceptive, logical, and critical interpretation of information is important to achieve good academic performance in Pre-university Accounting and Economics. However, good performance in SPM forecast in Foundations in Economics and Accounting may not contribute to good results in Pre-university Accounting or Economics or both. This prompts the need for future research to look into the relevance of the syllabus and assessment criteria of SPM Accounting and Foundation in Economics in helping secondary school students to progress in their future Business course(s).

Cluster sampling was used in this study; it is economical and feasible but the researcher compromised variance estimation efficiency (Ahmed 2009). The results of this study examined the relationship between SPM forecast results and achievement in Pre-university Business students in the Malaysian setting; hence, the results are applicable only locally and not globally.

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Final Year Engineering Project and Its Contribution to Holistic Education

Douglas Tong Kum Tien, Reynato Andal Gamboa, and Satesh Narayana Namasivayam

Abstract The final year project is a crucial component of engineering undergraduate education that is made a compulsory requirement by engineering accreditation bodies worldwide. This paper documents an approach toward the final year engineering project that is consistent with an outcome-based education methodology as required by accreditation bodies but also incorporates the development of a desirable range of graduate capabilities through its unique approach. The method, implementation, measurement of outcomes, and survey findings on the students taking this module are presented in this paper. For the measurement of outcomes, both qualitative and quantitative approaches were utilized. The quantitative approach consisted of using a Likert scale online survey as well as a software tool to capture the marks from various assessment components of the module to use as a comparison. The software tool links these assessment components to the module learning outcomes and the learning domains of Bloom's taxonomy. The marks attained were considered to be reflective of the attainment of the outcomes. The qualitative approach utilized a written survey that is part of the online survey. This online survey focused on student perceptions assessed through the Likert scale and written feedback instead of marks. The data obtained from both approaches were analyzed and compared, and the final year project module is evaluated for its effectiveness in delivering holistic education. These different approaches substantiated the findings of one another and helped determine to what extent the holistic education outcomes were achieved.

Keywords Holistic education • Final year engineering project • Learning domains

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1 Introduction

The Washington Accord's generic attributes are attributes that are to be embodied by an engineering graduate at the point of graduation from an engineering degree program (International Engineering Alliance 2013). The adoption of these attributes, which consist of the relevant knowledge, skills, and attitudes (KSA), is required for the accreditation of engineering undergraduate programs in countries that are signatories of the accord. This accord provides for mutual recognition of accredited engineering degrees from signatory countries. The Engineering Accreditation Council of Malaysia (EAC), through its professional body the Board of Engineers Malaysia (BEM) being a signatory of the accord, adopts these generic attributes through 12 generic program outcomes (POs). BEM has secured full signatory status for Malaysia since 2009 (BEM n.d.). Institutions of Higher Learning (IHL) which offer engineering undergraduate programs in Malaysia are free to craft their own POs, but their PO statements must include all the attributes of these 12 generic POs to qualify for accreditation (EAC 2012).

The POs for Taylor's University School of Engineering are crafted to align with the EAC's generic attributes, the CDIO attributes, the Grand Challenges Scholars Program attributes, and UNESCO's four pillars of learning as well as Taylor's Graduate Capabilities (Al-Atabi et al. 2013). CDIO which stands for conceive, design, implement, and operate is a worldwide initiative to close the gap between engineering education and real-world demand (CDIO n.d.), while the Grand Challenges Scholars Program is an initiative by the National Academy of Engineering (NAE) in the United States meant to prepare future engineering graduates to solve the 14 engineering grand challenges facing humanity in the twenty-first century as identified by the NAE (2014).

One of the key components in ensuring the attainment of the POs is the final year project (FYP). The FYP is an engineering activity that requires an individual student to solve a complex research-oriented engineering challenge over the course of a year. As the FYP represents one of the most difficult engineering challenges a student would need to undertake and with it occurring at the final stages of an undergraduate program, it would require the application of all relevant KSA. The FYP is a mandatory requirement in the engineering undergraduate curriculum (EAC 2012).

In order to ensure the successful attainment of the POs, IHLs implement various methods to measure these attainments. Gamboa and Namasivayam (2013) describe a software tool that is used to measure the attainment of the POs by students in an engineering degree. Being able to measure the attainment of these POs is necessary to determine the success of the engineering undergraduate programs. The authors also described the development and the application of such measurement technology to a variety of engineering programs to quantitatively measure outcome using the data to further improve the program.

The present paper presents an overview of how the implementation of an FYP module is shown to contribute toward the holistic education of an engineering undergraduate student.

1.1 Research Objective

To investigate the effect of undertaking a final year engineering project at Taylor's University School of Engineering on the holistic development of an engineering student.

1.2 Scope and Limitations

This investigation was conducted on the recent cohort of Taylor's University School of Engineering final year students who had just completed the final year project module. Prior to this, there was just one other cohort which had completed this module a year ago. However, the initiative to perform an investigation on holistic attainment of final year project students was not yet envisioned at that time.

Although the cohort consists of chemical engineering, electrical and electronic engineering, and mechanical students, their learning outcomes were the same, and the students underwent an identical educational process with a common objective; hence, they were evaluated together as a single entity instead of separately by program.

There was no deliberate intervention to the curriculum. The purpose was to determine if and to what extent the current process was able to contribute to the students' holistic development and how and why this happens or does not happen.

2 Literature Review

Holistic education means different things to different people. This brief literature review is an attempt to capture the essence of these various interpretations.

Although holistic education has long historical roots, the recent initiatives on holistic education began in the 1980s in the United States as a reaction against the dominant "mechanistic" worldview of education which was fragmented and reductionist in nature to one which aims to develop the human being to achieve their fullest potential in the broadest holistic sense (Mahmoudi et al. 2012).

UNESCO's four pillars of learning which consists of "learning to learn," "learning to do," "learning to live together," and "learning to be" could be considered as an attempt to approach education in a more holistic perspective. It is further argued that "learning to be" should be a fundamental focus under the current circumstances of education. Delors (as cited in UNESCO 2002, foreword) asserts that this "means going beyond an instrumental view of education, as a process one submits to in order to achieve specific aims (in terms of skills, capacities, or economic potential), to one that emphasizes the development of the complete person, in short, learning to be."

To achieve its aims, holistic education attempts to move beyond merely developing the cognitive learning domain of an individual to include the affective, social,

and psychomotor domains. In some cases, the religious and spiritual "domains" were also included in the discussion (Ismail and Hassan 2009; Bhatta 2009). In many cases, character development and values were also considered an important aspect of holistic education especially if a school has religious roots. One representative example can be observed in a paper presented by Seet et al. (n.d.) which details a Singapore Christian school's effort in this direction.

Defining holistic education and its various diverse approaches can be challenging. Nonetheless, an attempt has been made to classify various schools in the United States claiming to practice holistic education and in doing so laying the foundation for evaluating their achievements (Forbes and Martin 2004).

For tertiary educational institutions, efforts at holistic education have been attempted, but efforts were inclined to be more ad hoc, usually on a smaller scale and on a more immediate level of the module or the program. These were usually efforts initiated by an individual lecturer or a group of lecturers. The efforts tended to focus on Bloom's taxonomy of learning domains, namely, the cognitive, affective, and psychomotor domains with most attention focused on the affective domain.

With regard to engineering education, Vanspura et al. (2009) presented a model for strategically and holistically targeting students' development including the cognitive, psychomotor, social, and affective domains which they named the "four-domain development diagram." This model's target was primarily the students' mastery and motivation to learn the subject content and secondarily their ability to guide their mastery through moral and ethical development for the betterment and welfare of society. Lashari et al. (2013) attempted an affective-cognitive teaching and learning approach with the intent of increasing student engagement during class. While there is clear recognition that learning domains beyond the cognitive were important, however, the application of the other domains appeared more utilitarian than holistically developmental.

Nonetheless, engineering as a profession has already started to appreciate the role of the affective domain in developing a professional engineer. The American Society of Civil Engineers has recognized the need to balance the cognitive with the affective with regard to achieving its aspirational vision as a profession that deals aggressively with pressing emergent issues, and its educational program is reviewed to address this need (Lynch et al. 2009). There is a mention of the need for a plan for institutional change.

Apart from civil engineering, Ferris (2011) argues for the necessity to include objectives for the affective domain in systems engineering education as diverse competencies are required of a systems engineer to deliver a complex system.

Engineering as a profession recognizes the urgency to create well-rounded engineers with the right attributes of knowledge, skill, and attitude, or in terms of Bloom's taxonomy, these are also known as cognitive, psychomotor, and affective learning domains. This recognition is reflected in the program outcomes mandated by engineering accreditation bodies worldwide. Despite the noble intention, this objective is utilitarian in nature as it is meant to produce engineers capable of coping with the complex challenges of this twenty-first century, thus fulfilling the needs of the profession. Holistic education on the other hand encompasses all of Bloom's

learning domains but goes beyond that in its philosophy of developing human potential to its fullest.

While a clear definition of holistic education is still a work in progress, it is nevertheless obvious that the affective domain plays an important role in holistic development. A better understanding of how the affective domain is influenced in the course of undertaking an engineering education would be a small step toward advancing the knowledge base of holistic education as well as helping to meet the needs of the profession.

3 Research Methodology

The study involved an online survey conducted using Google Drive and was based on Bloom's taxonomy framework. The survey link was emailed to the graduating students who had completed the entire two semesters of the final year engineering project (FYP). To encourage their participation and honest responses, the survey was conducted anonymously. The form did not have a section for the name of the respondent.

In addition to the survey, the attainment of learning outcomes as measured by a software tool called ESAT was reviewed and compared against the survey results. ESAT which stands for "end of semester assessment tool" was developed by one of the authors (Gamboa and Namasivayam 2013) and is used throughout the School of Engineering to measure all modules with respect to learning outcomes and program outcomes.

3.1 Survey

The survey consisted of 22 questions as shown in the Appendix. The questions were a mix of Likert scale 1–5 questions and written responses. The questions were divided into three categories with one for each of Bloom's learning domain – cognitive, affective, and psychomotor. The survey questions attempted to relate the upper levels of each domain to the specific challenges of undertaking an FYP. The lower levels of each domain were not addressed in the survey as the FYP is a complex activity meant to develop the higher level Bloom's capabilities such that the attainment of the higher levels would indicate that the lower levels were already attained.

An additional section for the overall progress was also included to gauge the effectiveness of the entire module from an engineering perspective.

3.1.1 Cognitive Learning Domain

In the first section, there were three Likert-scaled questions corresponding to the three highest levels of Bloom's taxonomy for cognitive domain – analysis, evaluation, and synthesis. These three scaled questions were followed by a question to solicit positive feedback in a written form and another question to solicit negative feedback.

Table 1 describes the mapping of these domains to the survey questions.

Table 1 Mapping of cognitive learning domain and key verbs in the survey questions

Cognitive learning domain	Survey question key verbs
Analyzing	Examine
Evaluating	Judge
Creating/synthesis	Plan

Table 2 Mapping of affective learning domain and key verbs in the survey questions

Affective learning domain	Survey question key verbs
Responding to phenomena	Communicate
Valuing	Secure cooperation
Organization	Self-discipline
Organization	Ethical
Organization	Aware, strengths, and weaknesses
Internalizing values	Self-reliant
Internalizing values	Manage emotions

Table 3 Mapping of psychomotor learning domain and key verbs in the survey questions

Psychomotor learning domain	Survey question key verbs
Complex overt response	Proficiency
Adaptation	Apply
Adaptation	Train

3.1.2 Affective Learning Domain

In the second section, there were seven Likert-scaled questions corresponding to the four highest levels of Bloom's taxonomy for affective domain – responding to phenomena, valuing, organization, and internalizing values. These seven scaled questions were followed by a question to solicit positive feedback in a written form and another question to solicit negative feedback.

Table 2 describes the mapping of these domains to the survey questions.

3.1.3 Psychomotor Learning Domain

In the third section, there were three Likert-scaled questions corresponding to the second and third highest levels of Bloom's taxonomy for psychomotor domain – complex overt response and adaptation. These three scaled questions were followed by a question to solicit positive feedback in a written form and another question to solicit negative feedback.

Table 3 describes the mapping of these domains to the survey questions.

3.1.4 Overall Progress

This section was included to obtain a general understanding of students' perception of their progress in their overall ability as a future engineer to undertake engineering challenges. It is a separate question on its own and not a summation of the three domains. This question was intended to measure the students' confidence in facing engineering challenges which frequently require not only cognitive capabilities but also very much the affective and sometimes psychomotor capabilities.

3.2 ESAT Software Tool

The graded assessments of FYP for every student in the cohort were keyed into the ESAT. The ESAT output was compared against the survey results.

4 Results and Discussion

4.1 Survey Results and Discussion: Likert-Scaled Questions

46.8 % of the students responded to the survey. This represented 22 out of 47 students. As the survey was conducted anonymously, the authors were unable to determine which students did not respond and consequently were unable to follow up with the nonresponders individually. However, general reminders were sent by email. At the time of the survey, the students had already completed their final semester of study and were no longer on campus. Nonetheless, 46.8 % was still considered a good response to a survey. Results of the survey are presented and discussed below.

These results are presented in Fig. 1.

The Likert scale of 1–5 has "strongly disagree" at 1 and "strongly agree" at 5 with 3 being "neutral." The average results for each question surveyed varied from 3.6 to 4 with standard deviations ranging from 0.6 to 1. There were gains noted in all areas under investigation. As the variations were not large, this required further analysis. Figure 2 shows the percentage of responses of each 1–5 score for each question.

Respondents with the highest percentage, a total of 81.8 %, either agreed or strongly agreed, made progress with regard to being aware of their own strengths and weaknesses. This represented 18 out of 22 respondents. It is interesting to note that respondents perceived their greatest gain derived from undertaking a final year engineering project is an affective gain rather than a cognitive or psychomotor gain. Apparently, being pushed to their limits resulted in a better understanding of themselves. The FYP is usually considered the most challenging module in an undergraduate engineering program, and students have to take it as an individual project rather than as a group assignment.

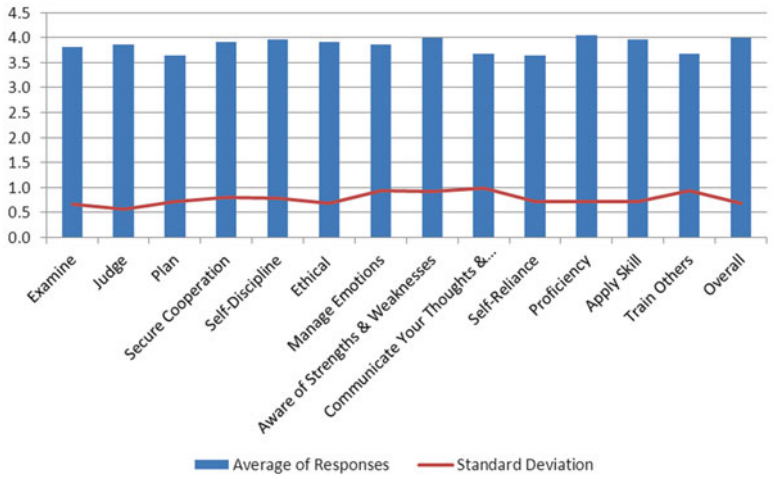

Fig. 1 Average Likert score vs. survey question

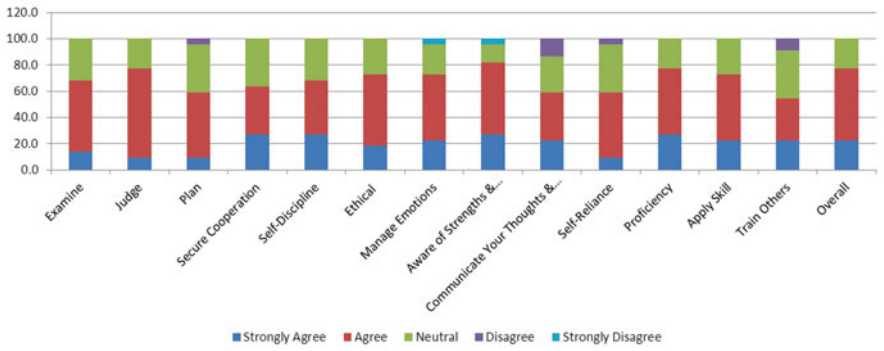

Fig. 2 Percent of respondents for each Likert score vs. survey question

Apart from awareness of strengths and weaknesses, other affective domain areas where respondents felt they made considerable progress were commitment to ethical standards and the ability to manage their emotions under stress with both registering 72.7 % respondents either agreeing or strongly agreeing. This is an encouraging development as despite the intensity of the module and the stress they experienced, the respondents improved their ability to cope and increased on their commitment to ethical standards instead of compromising on it.

The areas with the highest percentages of strongly agree were securing cooperation of others, self-discipline, and proficiency gained in a skill, all these at 27.3 % of respondents strongly agreeing. Again, it was interesting that two of these areas, namely, securing cooperation and self-discipline, fall under the affective domain. While the FYP is an individual assignment, it required the cooperation of other people to obtain resources. Securing cooperation is nonnegotiable. Self-discipline is

a key attribute in successful time management, while in the course of carrying out their project, the respondents had to learn new skills such as using new software, using lab equipment, fabricating experimental devices, and so on resulting in proficiency gains in a skill.

The lowest percentage obtained was for training others in a skill with only 54.5 % agreeing or strongly agreeing that they were confident in this area. This area falls under the psychomotor domain. This is understandable as their objective was to be proficient enough to use the skill in their own project rather than to be trainers of others. Psychomotor capability was not a stated objective; however, in the course of the FYP, it was encouraging that students mastered skills that they were confident enough to apply beyond the classroom.

Focusing on the affective domain alone, the lowest attainments were perceived to be communicating their thoughts and emotions clearly to others and self-reliance. Both of these areas registered only 59.1 % of respondents either agreeing or strongly agreeing. There were three students or 13.6 % who rated 2 for communication and 1 student or 4.5 % rated 2 for self-reliance. There were no 1s for these areas although they were the lowest rated for the affective domain. These are areas of concern. Much effort has been put into developing and enhancing the presentation skills of students in the engineering program beginning in semester 1 until the final semester when they complete their FYP. Perhaps, public presentation skills and genuine self-expression should be differentiated. The focus has always been on the former but not the latter. This may be an area that might require further attention. As the FYP is the students' first major individual assignment, it is unsurprising that their confidence in being self-reliant is somewhat low. It is an area that needs to be further developed.

There was only one respondent who used the score of 1. This respondent chose to give a score of 1 for managing emotions and awareness of strengths and weaknesses. This was in direct contrast to the trend in the general responses of other students. Many variables are at work including the nature of the project, the personality of the student and the supervisor, and other factors. Unless the student can be interviewed personally, it was not possible to identify causes. Since that is not possible due to the anonymity of the survey and since it has only one respondent, this was treated as a minor aberration that would not have any impact on the overall results of the entire survey.

For the cognitive domain, judging the quality of different ideas which is an attribute of evaluation registered the highest with 77.3 % of respondents either agreeing or strongly agreeing with regard to progress made. The lowest in this domain was the ability to plan a solution to a complex challenge after analyzing and evaluating it with only 59.1 % of respondents being confident of their progress made in this area. This area is an attribute of creating or synthesis and it is the highest level in the cognitive domain; therefore, it is also the most challenging. It is not surprising that it registered the lowest. More efforts need to be made to help students develop this specific capability so that they will have more confidence in their ability to formulate plans to address complex challenges.

It is worth mentioning that overall progress as in respondents' perception of their ability to solve engineering challenges registered at second highest with 77.3 %

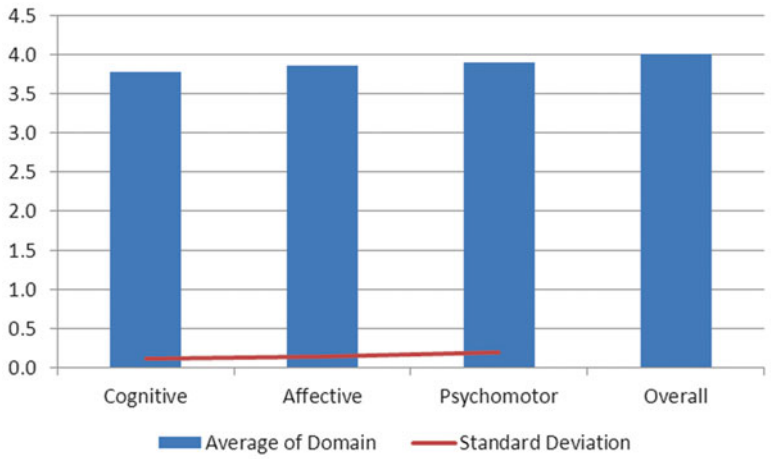

Fig. 3 Average scores and standard deviation for each learning domain

agreeing or strongly agreeing, just below the 81.8 % for the awareness of strengths and weaknesses.

In terms of average scores for each domain, this is presented in Fig. 3.

It can be observed that the averages were fairly similar for each domain; however, the affective and psychomotor were both slightly higher at 3.9 compared to the cognitive domain at 3.8. Comparing the affective and psychomotor domains which have similar averages of 3.9, the standard deviation for the affective domain is lower at 0.14 compared to that of the psychomotor at 0.19. From this observation, it appears that better progress was made in the affective domain compared to the other cognitive and psychomotor domains although the difference is slight.

Examining the raw data, there were 4 out of 22 students who rated no progress (a score of 3 and below) in all questions related to the cognitive and psychomotor domains, while only 3 students out of 22 did so when it came to the affective domain. This seemed to lend support to the notion that the greatest area of impact was on the affective domain. Again, the difference is slight.

Again, it is worth mentioning that overall progress as in respondents' perception of their ability to solve engineering challenges registered a score of 4.0 which was higher than that of each individual learning domain. This can possibly be linked to respondents' perception of their growth in all learning domains as well as the technical knowledge and technical experience they felt they had gained.

4.2 Survey Results and Discussion: Written Feedback

Majority of written responses were positive for all three domains. The feedback generally substantiated the results of the scaled questions. There were exceptions noted and mentioned below.

It was interesting that the same respondents who rated no progress by giving a score of 3 or below for every question in an entire domain tended to give positive written feedback for those same domains. It bears repeating that the survey was conducted anonymously to encourage honest feedback. However, Google Drive captures the time of submission, and therefore, it was possible to separate each respondent despite not knowing their identity.

There was only one respondent among those who rated an entire domain at 3 or less who gave a written feedback that was not positive. This was given for the affective domain in the area of handling emotions – "didn't learn much in handling emotion." This was also the same student who gave scores one as mentioned in Sect. 4.1, the only student to use a 1 score. This student stands in contrast to the results for this area where it was found to have a good score with 72.7 % respondents either agreeing or strongly agreeing in the scaled question. One respondent who gave a score of 5 for this question has this to feedback – "…Besides that, the manage of emotions skills has been improved through having the experience of handling stress like lost of direction or lack of idea while doing FYP. Furthermore, FYP has helped me to understand more about my strengths and weaknesses."

Two other respondents reported that their progress in the FYP was hampered due to weaknesses in communication. This was already identified as an area of weaknesses in the survey results in Sect. 4.1. One of them acknowledged a slight improvement in communication but felt that the improvement was still insufficient – "Fail communication really affected the research progress. I feel that I might have improved a bit in expressing my thought and ideas to others, but the area still need an improvement." The other respondent gave this feedback – "miscommunication with supervisor at times due to conflict of ideas." Nevertheless, such challenges should be viewed positively as it gives impetus for the student to improve their ability to express themselves as well as to receive ideas different from their own.

On the positive side, there were three respondents who acknowledged they made progress in communication in their written survey feedback. All three of them reported that their public presentation skills have improved through participation in an undergraduate research conference that was a compulsory assessment component of the FYP (Al-Obaidi et al. 2014). However, only one out of these three respondents went beyond commenting on public presentation skills and gave an additional remark about learning to communicate with people of different backgrounds – "As overall, I learnt to communicate with people from different backgrounds (suppliers, lab assistant)."

For the overall progress, in terms of solving engineering challenges, one respondent had this to feedback – "My FYP will not really help with solving engineering challenges as the project is not applicable for real life challenges. Perhaps the other projects in the previous semesters did help." However, the same respondent gave a score of 4 for the overall progress. This respondent's scores in the scaled survey also tended to be positive with only three scores of 3, one in each domain, while the rest of the respondent's other scores were above 3. This seemed like a glaring inconsistency. Perhaps this respondent failed to appreciate their holistic growth which will help in future career achievements but focused instead on the technical nature of

their FYP which was assumed to be less relevant to the immediate job market. Apart from this feedback, there was no other negative feedback for the section on overall progress.

4.3 ESAT Results and Discussion

The software tool ESAT provided the results shown in Figs. 4, 5, and 6 for the same cohort of students. These results are program specific. The results were obtained through mapping the assessments to the learning domains as shown in Table 4. For measurement using the ESAT tool, the psychomotor domain was not mapped as not every FYP had a psychomotor component.

The bars in the graphs of Figs. 4, 5, and 6 represent the percentage of students who achieved an aggregate score of 60 % or more for the respective domains mapped through their graded assessments. For the affective domain, chemical engineering (CE) registered 92.3 % achieving 60 % or more as measured through their graded assessments and electrical and electronic engineering (EE) registered 81.8 %, while mechanical engineering (ME) registered 72.7 %. These percentages were identical for the cognitive domain for both CE and EE, while ME registered 81.8 % for the cognitive domain, higher than its affective domain of 72.7 %.

It was observed that gains were made although the instrument used (ESAT) and the method of measurement were different from the survey tool. Mapping of assessments to learning domains is not an exact science. It requires human judgment. However, if it was performed with careful thought, it should provide a realistic degree of correlation. Positive gains would be reflected positively and if negative likewise. The ESAT results which included the entire cohort of students substantiated the survey results of 46.8 % of the cohort by showing similar noteworthy gains in the cognitive and affective domains.

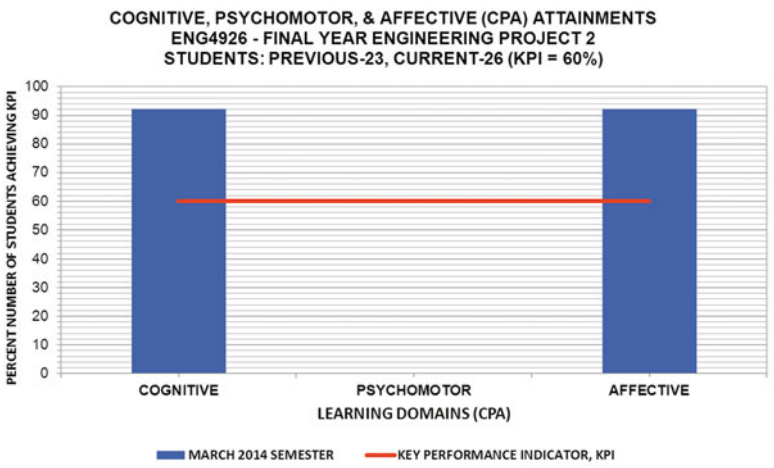

Fig. 4 CPA attainments for chemical engineering final year project students

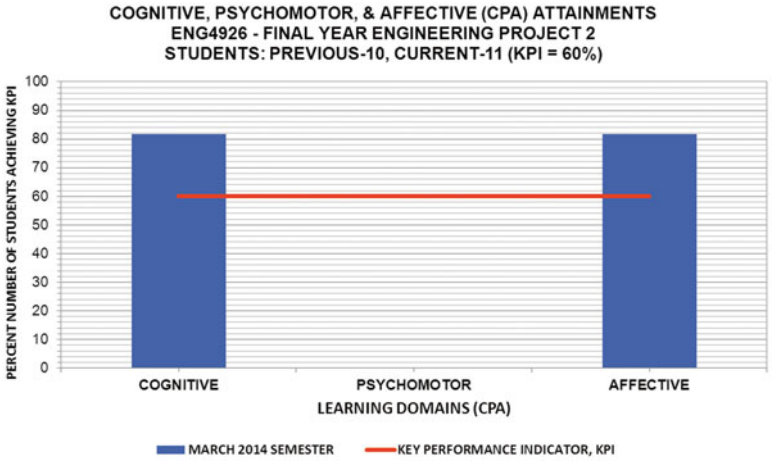

Fig. 5 CPA attainments for electrical and electronic engineering final year project students

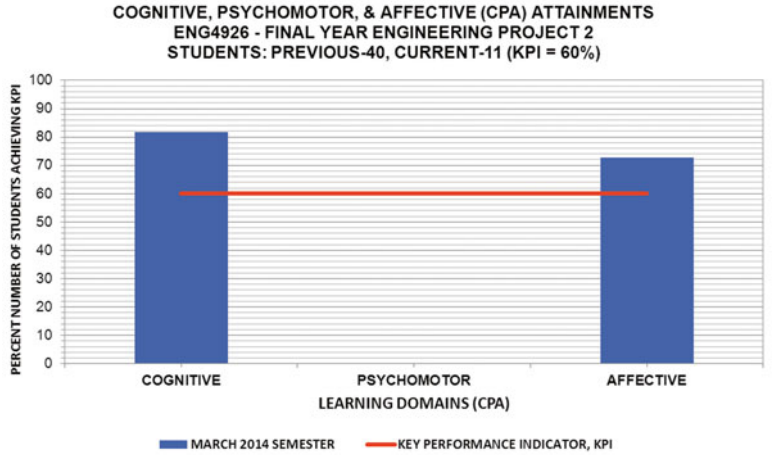

Fig. 6 CPA attainments for mechanical engineering final year project students

Table 4 Mapping of assessment components to learning domains for FYP2

Assessment type	Learning domain	Percentage of total marks
Meeting record	Cognitive, affective	20
Conference paper	Cognitive	10
Thesis	Cognitive	40
Oral defense	Cognitive, affective	10
Conference presentation	Cognitive, affective	10
Engineering fair participation	Cognitive, affective	10

5 Conclusion and Future Work

An investigation was performed to answer the research question of whether a final year engineering project module can help engineering students develop holistically. The framework used was Bloom's taxonomy of learning domains. The primary instrument used was an online survey. The survey results were substantiated by a software tool known as ESAT.

The survey results indicated gains in each learning domain with the highest gain being in the affective domain. The specific area that registered the highest score was the awareness of personal strengths and weaknesses. Gains in ability to manage emotions under stress and commitment to ethical standards were also significant. In addition, there were noteworthy gains in securing the cooperation of others and self-discipline with these having the highest percentages of respondents strongly agreeing. The lowest gains were observed to be in the ability to communicate one's thoughts and emotions clearly to others and being self-reliant.

For the cognitive domain, judging the quality of different ideas registered the highest gain, while planning a solution to a complex challenges the lowest. For the psychomotor domain, gaining proficiency in a skill was the highest, while confidence in training others in that skill was the lowest.

The students' perception of their overall progress in their ability to solve engineering challenges was observed to be high. This indirectly reflected positively on their entire progress in all the three learning domains.

Future work would involve refining the survey tool, aiming for 100 % of a future cohort responding to the survey, comparing those results with these as well as considering if intervention measures are needed in the design, delivery, or assessment of this module in light of the survey results.

Appendix: Survey Questions

Cognitive Learning Domain: The Head

Having completed FYP recently, please answer the following questions.

1 – strongly disagree	2 – disagree	3 – neither agree nor disagree
4 – agree	5 – strongly agree	

C1. Do you think that you are better equipped and more confident of your ability to **examine** a problem in detail in order to explain or interpret it? (Analysis)

1	2	3	4	5

C2. Do you think that you are better equipped and more confident of your ability to **judge** the quality of different ideas? (Evaluation)

1	2	3	4	5

C3. Do you think that you are better equipped and more confident of your ability to **plan** a solution to a complex challenge after having analyzed and evaluated it? (Synthesis – formulation)

1	2	3	4	5

Please comment on your progress made in the areas above as a result of having completed the FYP.

If you think that the FYP did not help you make any progress in the areas above, **please comment**.

Affective Learning Domain: The Heart

A1. Do you feel better equipped and more confident of your ability to **secure** the **cooperation** of others in order to get things done?

1	2	3	4	5

A2. Do you feel that you have made progress in your **self-discipline** when managing challenging time constraints?

1	2	3	4	5

A3. Do you feel more personally committed to the **ethical** standards required of a person tasked with carrying out a research project?

1	2	3	4	5

A4. Do you feel that the experience has helped you grow in your ability to **manage** your **emotions** better when faced with stressful situations?

1	2	3	4	5

A5. Do you feel that the experience has helped you become more **aware** of your own **strengths and weaknesses**?

1	2	3	4	5

A6. Do you feel that your ability to **communicate** your thoughts and emotions clearly to others has improved?

1	2	3	4	5

A7. Do you feel more confident of your ability to be **self-reliant**?

1	2	3	4	5

Please comment on your progress made in the areas above as a result of having completed the FYP.

If you feel that the FYP did not help you make any progress in the areas above, please comment.

Psychomotor Learning Domain: The Hands

P1. Do you feel that you have gained **proficiency** in any one of the following skills – conducting experiments, using lab equipment, using FYP-related software, or fabricating an experimental device?

1	2	3	4	5

P2. Continuing from the previous question, do you feel confident enough to **apply** this skill in a real-life situation?

1	2	3	4	5

P3. Continuing from the previous question, do you feel confident enough to **train** others in this skill in a real-life situation?

1	2	3	4	5

Please comment on your progress made in the areas above as a result of having completed the FYP.

If you think that the FYP did not help you make any progress in the areas above, please comment.

Overall Progress

O1. Do you believe that you are better equipped and more confident of your ability to **solve engineering challenges** having completed the FYP than before you started the FYP?

1	2	3	4	5

Please comment on your ability to solve engineering challenges as a result of having completed the FYP compared to before you started FYP.

If you think that the FYP did not help you make any progress in this area, please comment.

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Learning of Web Quality Evaluation: A Case Study of Malaysia National Museum Web Site Using WebQEM Approach

Reza Meimandi Parizi, Azween Abdullah, and Hemalatha Ramalingam

Abstract The World Wide Web offers museums the possibility to disseminate information about their collections publically so they may attract people to come and visit the actual museum. In attributing communicative and interactive functions to a museum's Web site, it is especially important to keep in mind the users and their needs for easy interaction. Sometimes, many museums' Web sites exclude this matter or consider it in a weakly manner. The attractiveness of these virtual museums depends on many issues, especially their quality, as it is such a complex solution. In this paper, we present a quantitative quality evaluation on Malaysia's national museum (Museum Negara) Web site by utilizing the Web site quality evaluation method (QEM). This is conducted to (1) assess and highlight the main quality issues that can arise within this Web site domain and (2) demonstrate the application of QEM methodology using a practical example. Surveying and measuring such quality criteria can improve the quality of Web products based on the existing level of quality at hand, as well as fulfilling the needs of specific users that may contribute to various industries and learning process.

Keywords Web application • Quality evaluation • Museum • WebQEM

1 Introduction

The main purpose of a Web site is to attract users and their persistent attentions (Xu et al. 2003). Therefore, in order to pursue such goals, we should design, implement, and adjust the structure and contents of the whole Web site in the users' view. In other words, for understanding, controlling, and improving the quality of such Web site, more generally, Web application, we need sound evaluation methods that can give us reliable information about the state of these Web artifacts. These methods

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should identify attributes and characteristics that can serve as meaningful indicators for specific evaluation goals given a user viewpoint.

But it is important to note that the eminent growth of Web application and the emergence of various technologies have made the Web site domains such as museums, academic, e-commerce, etc., as complex systems; hence assessing the quality of such Web products regarding for quality characteristics can be a tedious and complex task.

Besides, the traditional quality metrics, proposed by software evaluation community, are only suited when the evaluation problem is rather simple and intuitive. In other words, they cannot be helpful while they are dealing with the complex systems, especially in terms of reliability and efficiency. Therefore, we need a broad, integrated, engineering-based evaluation method and process model for the assessment and comparison of complex Web site quality requirement, such as QEM (Olsina Santos 1999).

The main goal of this paper is to evaluate the level of achievement of the required quality characteristic such as reliability, usability, functionality, etc., in the domain of Malaysia's national museum Web site by using a quantitative-based method, which is called WebQEM. We believe that by assessing and making comparison among the quality characteristics and attributes of such domain, we can gain better understanding of the current state of Web site quality evaluation that may lead us to produce high-quality Web product.

The rest of the paper is organized as follows: Sect. 2 presents the background and related work on WebQEM and quality characteristics and its attributes; Sect. 3 gives the methodology; Sect. 4 describes Elementary Measurement; Sect. 5 presents analysis and comparison on the results of functionality and usability; Sect. 6 reports the conclusion.

2 Background and Related Work

This section provides the reader with the information on basic concept of QEM methodology, as well as background on quality characteristics and its attributes, from the literature, which are needed for developing, implementing, and evaluating the Web sites in any given domain. This information can help the reader better understand the rest of the paper.

2.1 Overview of WebQEM

Figure 1 shows a high-level view of the major steps required for quality evaluation and comparison within the QEM framework. Next, we briefly describe the six major process steps that evaluators should follow by applying the Web site QEM as their methodology (Olsina Santos 1999):

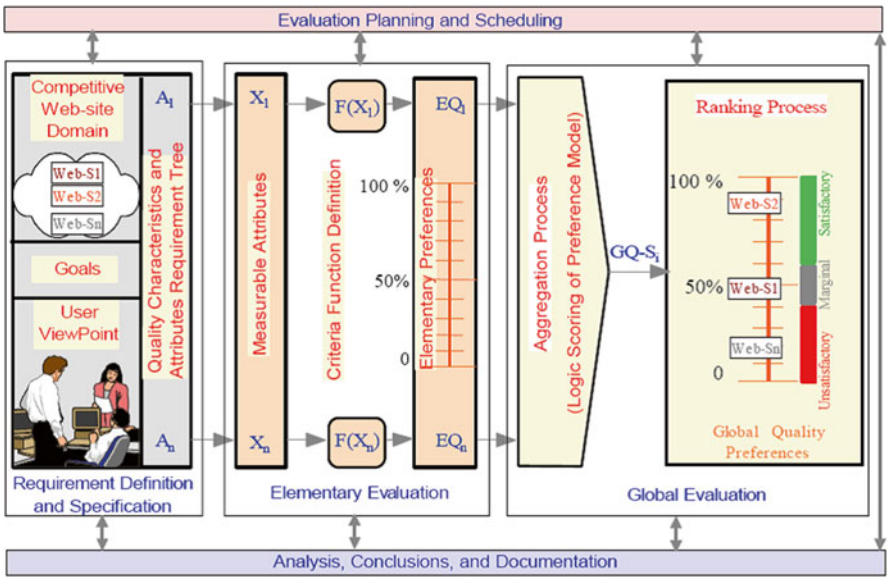

Fig. 1 A high-level view of the Web site quantitative evaluation and comparison

Step one. Selecting a site or a set of competitive sites to evaluate or compare: In this step, decision makers should know what the evaluation domain is and select the systems to assess. For instance, regarding web-based information system or subsystems, we should emphasize more usability than security characteristic or both, depending on the specific situation.

Step two. Specifying goals and the user viewpoint: In this step, evaluators should define the goals and scope of the evaluation process. They could assess a new running Web project, or an operational project, and could evaluate the quality of a set of attributes or sub-characteristics, a subsystem, an overall system, or compare characteristics or global preferences of competitive systems.

Step three. Defining the Web site quality characteristics and attribute requirement tree: In this process step, evaluators should define and specify the quality characteristics and attributes, grouping them into a requirement tree. From these characteristics, they derive sub-characteristics, and from these, they can specify attributes with minimal overlap. For each quantifiable attribute Ai, they can associate a variable Xi, which can take a real value: the measured value.

Step four. Defining criterion function for each attribute and applying attribute measurement: In this process, the evaluators should define the basis for elementary evaluation criteria and perform the measurement subprocess. Elementary evaluation criteria show how to measure quantifiable attributes. The result is an elementary preference, which can be interpreted as the degree or percentage of satisfied requirement. For more information, refer to Olsina Santos (1999).

Step five. Aggregating elementary preferences to yield the global quality preference: In this step, the evaluators should prepare and enact the evaluation process to obtain an indicator of global preference for each competitive system or for a single evaluated system. For n attributes, the mapping produces n elementary quality preferences. Applying a stepwise aggregation mechanism, the elementary quality preference can be grouped accordingly and resulting to the global quality preference. The global quality preference represents the global degree of satisfaction of all involved requirements.

Step six. Analyzing, *assessing*, *and comparing partial and global quality preferences*: In this final step, the evaluators analyze, assess, and compare the elementary, partial, and total quantitative results regarding the established goals and user view. Feedback cycles could be necessary.

2.2 Quality Characteristic

Experience shows that Web site attributes play a major role in creating demand for developing and implementing the Web site of the organizations. In order to effectively select quality characteristics and attributes for implementing or evaluating a given Web site, we should firstly consider the specific kind of user (Olsina and Rossi 1999). More specifically, the domain of Web site and different views of quality can determine the required quality characteristics and its attributes.

Based on the international standards IEEE and ISO/IEC (1993), there are several points that define software quality. The ISO standard defines three views of quality: users' view, developers' view, and managers' view. Users are interested in the quality in use, which is mainly an external characteristic, while developers and managers are more interested in internal quality, which affects maintainability, portability, cost-effectiveness, and so on.

Oreste Signore (2005) states that the first step in the quality assessment process is an automatic check of the source code, followed by manual evaluation, possibly supported by an appropriate user panel. Therefore, he defines a quality model and a set of characteristics (correctness, presentation, content, navigation, and interaction) that can be measured in an automated fashion, relating internal and external quality factors and giving clues about potential problems. In this context, evaluating the quality of a Web site requires expensive methods such as heuristic evaluations and/or empirical usability tests. As many existing tools can perform some analysis, the general architecture will be based upon a conceptual model of the site/page, and the tools will export their output to a quality database. Besides, Harris and Harbstreit (2005) suggest that these important characteristics should be added to the quality of agricultural education departmental Web sites. Therefore, they identified four high-level characteristics, usability, functionality, operational reliability, and interactivity, with 73 specific characteristics included in the evaluation matrix. Consequently, they found different stages of development in the Web sites, and continued improvement is needed.

IEEE and ISO/IEC (1993) standards for software quality metrics and guidelines present high-level characteristics like usability, functionality, reliability, efficiency, portability, and maintainability. These characteristics provide developers or evaluators with a conceptual and general description of software quality and provide a baseline for further decomposition. A quality characteristic can be decomposed into multiple levels of sub-characteristics, and in turn, a sub-characteristic can be refined into a set of measurable attributes.

Olsina (1999) in his work used the same high-level quality characteristics as mentioned in IEEE Std (1993). But he restricted his attention to the four characteristics which are usability, functionality, reliability, and efficiency. Next, sub-characteristics are derived and from them, measurable attributes and variables are specified. Olsina presents a methodology for the quantitative evaluation and comparison of Web site quality called Web site quality evaluation method (as discussed in Sect. 2.1). On the other hand, Olsina et al. (2000) propose a quantitative methodology, actually a mixture of prescriptive and descriptive strategies that can be useful to evaluate and compare quality characteristics and attributes of complex Web sites in the operative phase. To do so, they evaluate the level of accomplishment of required quality characteristics (like usability, functionality, reliability, efficiency, and derived sub-characteristics) in the given Web sites. In other words, they use the same high-level quality characteristics as used in IEEE Std (1993) and Olsina Santos (1999).

Table 1 gives the summary of the related works discussed, where each row denotes the quality characteristic and each column represents the related work, reference number.

Based on the above literature (related works), we can compare the use of these characteristics in different views. IEEE and ISO/IEC (1993) define a quality model which is applicable to every kind of software. ISO defines six product quality characteristics based on user, developer, and manager view. Olsina (1999), Olsina et al. (2000), and Harris and Harbstreit (2005) suggest four measurable

Table 1 Summary of related works

Characteristic	IEEE Std (1993)	Signore (2005)	Harris and Harbstreit (2005)	Olsina Santos (1999)	Olsina et al. (2000)
Usability	✓		✓	✓	✓
Functionality	✓		✓	✓	✓
Reliability	✓		✓	✓	✓
Efficiency	✓			✓	✓
Portability	✓				
Maintainability	✓				
Interactivity			✓		
Correctness		✓			
Presentation		✓			
Content		✓			
Navigation		✓			
Interaction		✓			

attributes (usability, functionality, reliability, efficiency) regarding the visitor standpoint. Specifically, from the user's point of view, artifact characteristics such as maintainability, portability, and interactivity will not be necessary to be evaluated (support developers' and managers' view). Users are mainly interested in the ease of use and communicativeness of the Web site, in its browsing and search mechanisms, in its coherent navigation mechanisms and dependent-domain expected functionality, and also in the site reliability and efficiency. By right, these are what exactly the developers or evaluators must consider: some HCI (human-computer interaction) principles in designing, implementing, and evaluating their Web product, Web site.

3 Methodology

3.1 Basic Process of the Web Site QEM

We apply the WebQEM methodology to our case study which is Museum Negara Malaysia. We describe the major process steps of WebQEM followed by applying the Web site QEM (Olsina and Rossi 1999), namely:

1. *Selecting a site or a set of competitive sites to evaluate or compare*: Here, we select Museum Negara Malaysia (http://www.museum.gov.my).
2. *Specifying goals and the user viewpoint*: We want to evaluate the quality of functionality and usability of the abovementioned site, to assess if each of them falls in satisfactory, marginal, or unsatisfactory category, regarding Olsina's category definition.
3. *Defining the Web site quality characteristics and attribute requirement tree*: We will use Olsina's requirement tree for the museum Web site in evaluating the Museum Negara Malaysia site. This part will be completely described in Section IV.A.
4. *Defining criterion function for each attribute and applying attribute measurement*: This part will be completely described in Section IV.B.
5. *Aggregating elementary preferences to yield the global Web site quality preference*: This part will be completely described in Section V.
6. *Analyzing*, *assessing*, *and comparing partial and global outcomes*: This part will be completely described in Section VI.

3.2 Some Consideration About the Case Study

One of the main goals for the Museum Negara Web site assessment is to understand the extent to which a selected set of quality attributes fulfill a given set of stated requirements. Software artifacts are generally produced to satisfy specific user's needs, and Web site artifacts are not the exception (Olsina Santos 1999). In designing Web site artifacts, there are many challenges that frequently are minimized. For instance,

when users enter the first time at a given home page, they often can figure how to find a piece of information quickly. There are two mechanisms that would help in achieving that task: browsing and searching. Thus, to get a time-effective mental model of the overall site (i.e., structure and content), attributes such as a site map, an index, or a table of contents would be helpful in getting quick global site understandability. These attributes facilitate browsing. However, a global searching function provided in the main page could effectively help retrieve the desired piece of information and avoid browsing. Moreover, both functions could be complemented at any moment. There are many attributes and characteristics that contribute to site quality. These attributes include usability, functionality, and reliability among others that a designer should take into account when designing for intended audiences. So, to analyze and draw a conclusion about the state of the art of essential quality characteristics and attributes, we chose a museum domain, which is important to the tourism industry in a tourist-centric country such as Malaysia. Figure 2 shows some snapshots of Museum Negara Malaysia Web site chosen as our case study.

Fig. 2 The Museum Negara Malaysia

4 The Elementary Measurement

4.1 Web Site Quality Characteristics and Attribute Requirement Tree

Olsina (1999) defines and categorizes a wide set of quality attributes grouping them into a requirement tree for museum Web sites. To follow well-known standards, we apply the same high-level characteristics and sub-characteristic used by Olsina like usability and functionality. From these characteristics, because Olsina's quality model is completely applicable for our purpose to evaluate Museum Negara Web site, we use its measurable attributes and variables and measurement process. Figure 3 outlines the major characteristics and measurable attributes regarding the visitor standpoint.

1. Usability
1.1 Global Site Understandability
1.1.1 Global Organization Scheme
1.1.1.1 *Site Map*
1.1.1.2 *Global Index (Subject, Alphabetic)*
1.1.1.3 *Table of Content*
1.1.2 Quality of Labeling System
1.1.2.1 *Textual Labeling*
1.1.2.2 *Iconic Labeling*
1.1.3 *Guided Tours*
1.1.3.1 *Conventional Tour*
1.1.3.2 *Virtual Tour (*)*
1.1.4 *Floor and Room Image Map*
1.2 Feedback and Help Features
1.2.1 Quality of Help Features
1.2.1.1 *Web-site Explanatory Help*
1.2.1.2 *Search Help*
1.2.2 Web-site Last Update Indicator
1.2.2.1 *Global*
1.2.2.2 *Scoped (per sub-site or page)*
1.2.3 Addresses Directory
1.2.3.1 *E-mail Directory*
1.2.3.2 *Phone-Fax Directory*
1.2.3.3 *Post mail Directory*
1.2.4 *FAQ Feature*
1.2.5 *Survey/Questionnaire Feature*
1.3 Interface and Aesthetic Features
1.3.1 *Cohesiveness to Group Main Control Objects*
1.3.2 Presentation Permanence and Stability of Main Controls
1.3.2.1 *Direct Controls Permanence*
1.3.2.2 *Indirect Controls Permanence*
1.3.2.3 *Stability*
1.3.3 *Aesthetic Preference*
1.3.4 *Style Uniformity*
1.4 Miscellaneous Features
1.4.1 *Foreign Language Support*
1.4.2 *Download Feature*

2. Functionality
2.1 Searching Issues
2.1.1 Web-site Search Mechanisms
2.1.1.1 *Scoped Search (Collection sub-site)*
2.1.1.2 *Global Search*
2.2 Navigation (and Browsing) Issues
2.2.1 Local Navigability
2.2.1.1 *Level of Local Interconnection (for a Collection sub-site)*
2.2.1.2 *Orientation*
2.2.1.2.1 *Indicator of Path*
2.2.1.2.2 *Label of Current Position*
2.2.2 Global Navigability
2.2.2.1 *Coupling among Sub-sites*
2.2.3 Navigational Control Objects
2.2.3.1 Presentation Permanence and Stability of Contextual Controls
2.2.3.1.1 *Contextual Controls Permanence*
2.2.3.1.2 *Contextual Controls Stability*
2.2.3.2 Level of Scrolling
2.2.3.2.1 *Vertical Scrolling*
2.2.3.2.2 *Horizontal Scrolling*
2.2.4 Navigational Prediction
2.2.4.1 *Link Title (link with explanatory help)*
2.2.4.2 *Quality of Link Phrase*
2.3 Domain Specific and Miscellaneous Functions
2.3.1 *Content Relevancy (this attribute could be decomposed)*
2.3.2 *Link Relevancy*
2.3.3 Electronic Commerce
2.3.3.1 Purchase Features
2.3.3.1.1 *Shopping Basket Facility*
2.3.3.1.2 *Quality of Product Catalog*
2.3.3.2 *Secure Transaction*
2.3.4 Image Features
2.3.4.1 *Image Size Indicator*
2.3.4.2 *Zooming*

Fig. 3 Requirement tree regarding the museum domain and the general visitor view (the attributes marked with the * sign were not considered in this study)

4.2 Establishing Elementary Criteria and Data Collection

For each attribute Ai, we can associate a variable Xi which can take a real value by means of the elementary criterion function. The final result represents a mapping of the function value into the elementary quality preference, EQi. The value of EQi is a real value that "fortunately" belongs to the unit interval. As stated by Dujmovic (1996):

> The elementary preference is interpreted as a continuous logic variable. The value 0 denotes that Xi does not satisfy the requirements, and the value 1 denotes a perfect satisfaction of requirements. The values between 0 and 1 denote a partial satisfaction of requirements. Consequently, all preferences are frequently interpreted as a percentage of satisfied requirements, and defined in the range [0, 100 %].

To this end, we have adopted the detailed elementary criteria for usability and functionality characteristic proposed by Donciulescu et al (2004). With respect to these criteria, the obtained preferences can be categorized in three rating levels in the Web site QEM, namely, satisfactory (from 60 to 100 %), marginal (from 40 to 60 %), and unsatisfactory (from 0 to 40 %). For instance, a marginal score for an attribute could indicate that a correction action to improve the attribute quality should be taken into account by the manager or developer.

4.3 Performing Attribute Measurement

Now, after the data collection, we can compute the variable value and the elementary quality preference for each attribute of usability and functionality characteristic. Tables 2 and 3 show some results of elementary preferences after computing the corresponding criterion function to the *usability* and *functionality* characteristics, respectively. This activity was performed for each characteristic (*usability* and *functionality*) of the Museum Negara Web site.

Finally, we should make some considerations with regard to data collection. The data collection activity can be done manually, semiautomatically, and automatically. Most of the attribute values were collected manually because there is no way to do it otherwise (Olsina Santos 1999). For instance, it is the case to check if there exists a *Table of Content*, a *Site Map*, or a *Guided Tour* attribute. Likewise, compute the level of *Foreign Language Support* or check the availability of a *Scoped Search*. In many cases, the data is easy to collect and verify. Moreover, for all attributes measurable by a direct preference criterion, the unique way to draw an outcome is by means of an expert human judgment. In doing so, we consulted two Web experts; score the direct measure attributes, each of them having at least 4 years of experience in Web application development. In these cases, the assessment could be harder. On the other hand, automatic data collection in many instances is more reliable and is almost a unique mechanism to collect data for a given attribute. This was the case with the *Image Title* attribute to measure.

Table 2 Partial results of elementary quality preferences (for usability characteristic)

Usability	
Attribute Ai	Scores EQi
1.1.1.1.	100
1.1.1.2.	0
1.1.1.3.	0
1.1.2.1.	0
1.1.2.2.	0
1.1.3.1.	100
1.1.3.2.	0
1.1.4.	80; $D=0.8$
1.2.1.1.	0
1.2.1.2.	0
1.2.2.1.	100
1.2.2.2.	0
1.2.3.1.	100
1.2.3.2.	100
1.2.3.3.	100
1.2.4.	100
1.2.5.	0
1.3.1.	70
1.3.2.1.	80
1.3.2.2.	80
1.3.2.3.	70
1.3.3.	60
1.3.4.	80
1.4.1.	60; $N=2$, $S=1$
1.4.2.	0

Table 3 Partial results of elementary quality preferences (for functionality characteristic)

Functionality	
Attribute Ai	Scores EQi
2.1.1.1.	0
2.1.1.2.	100
2.2.1.1.	0
2.2.1.2.1.	0
2.2.1.2.2.	0
2.2.2.1.	70
2.2.3.1.1.	70
2.2.3.1.2.	70
2.2.3.2.1.	0
2.2.3.2.2.	0
2.2.4.1.	0
2.2.4.2.	80
2.3.1.	80
2.3.2.	80
2.3.3.1.1.	0
2.3.3.1.2.	0
2.3.3.2.	0
2.3.4.1.	0
2.3.4.2.	0

5 Aggregation

In the process of aggregation, the evaluators should define and prepare the evaluation process to obtain a quality indicator for each competitive system. Applying a stepwise aggregation mechanism, the elementary quality preferences can be accordingly structured to allow the computing of partial preferences and at last obtain the global preference. The global quality preference represents the global degree of satisfaction of all involved requirements. A logical scoring model (LSP) has been adopted. The strength of LSP is its power to model different logical relationships to reflect the stakeholders' needs, namely:

1. Simultaneity, when it is perceived that two or more input preferences must be presented simultaneously
2. Replaceability, when it is perceived that two or more attributes can be replaced
3. Neutrality, when it is perceived that two or more input preferences can be grouped independently
4. Symmetric relationships, when it is perceived that two or more input preferences affect evaluation in the same logical way
5. Asymmetric relationships, when mandatory attributes are combined with desirable or optional ones and when sufficient attributes are combined with desirable or optional ones

We implemented these aggregation procedures for usability characteristic and also functionality characteristic in excel, using it to achieve the functionality and usability scores for Museum Negara site.

6 Analysis and Results

In this Web site QEM process step, the evaluators analyzed, assessed, and compared the partial and global outcomes regarding the stated goals and users' view. With this, results dumped in Tables 2, 3, 4, 5, and 6, final results shown in graphic diagrams (as illustrated in Fig. 6), and schemas depicting models of complex aggregation criterion functions (as shown in Figs. 4 and 5) are useful tools and sources of information to analyze and draw conclusions about the quality of artifact features under evaluation.

Table 6 shows the outcomes for the functionality and usability characteristic preferences for Museum Negara Malaysia, and Fig. 6 represents the degree of the satisfaction of functionality and usability characteristic. The colored quality bars at the bottom of Fig. 6 indicate the rating levels as previously defined: satisfactory (green), marginal (gray), and unsatisfactory (red).

The museum obtained 65.487 % of the usability quality preference, which is a satisfactory rating. Regarding the characteristic indicator of preference, a scoring within a gray bar can be interpreted as improvement actions that should be considered,

Table 4 Detailed results of usability preferences after computing the corresponding aggregated criterion function for Museum Negara site

1	Usability	Scores
1.1.1.1.	Site map	100
1.1.1.2.	Global index (subject, alphabet)	0
1.1.1.3.	Table of content	0
1.1.2.1.	Textual labeling	0
1.1.2.2.	Iconic labeling	0
1.1.3.1.	Conventional tour	100
1.1.3.2.	Virtual tour	0
1.1.4.	Floor and room image map	80
1.2.1.1.	Web site explanatory help	0
1.2.1.2.	Search help	0
1.2.2.1.	Global	100
1.2.2.2.	Scoped (per sub-site or page)	0
1.2.3.1.	Email directory	100
1.2.3.2.	Phone-fax directory	100
1.2.3.3.	Post mail directory	100
1.2.4.	FAQ feature	100
1.2.5.	Survey questionnaire feature	0
1.3.1.	Cohesiveness to group main Control objects	70
1.3.2.1.	Direct control permanence	80
1.3.2.2.	Indirect control permanence	80
1.3.2.3.	Stability	70
1.3.3.	Aesthetic preference	60
1.3.4.	Style uniformity	80
1.4.1.	Foreign language support	60
1.4.2.	Download feature	0

as long as an unsatisfactory rating level can be interpreted as necessary change actions must be taken (as observed in Table 6 for our case study, *functionality* characteristic scored 32.303 %). Particularly, we can go back and refine the analysis to see why the *functionality* characteristic resulted in that score. By observing Table 5, the evaluators (and stakeholders in general) can argue that *searching* functionality is lacking in the site (scoped search). This gives a low result (45) to *searching* sub-characteristic (which is input to the D-week disjunction operator, 0.25 weighted). Also the local navigability characteristic is 0, which has a very bad effect on the *navigation* element. This can be improved by adding *indicator of path* and *label of current position* to the Web site. With this, we can conclude that Museum Negara Malaysia Web site should improve the functionality, by adding a search feature, and improve some navigability issues like indicator of path. In addition, in the Domain Specific and Miscellaneous Features, the absence of these last attributes contributes to the lack of *image features* like *image size indicator* or *zooming*, when the visitor requires some information for in this case. Finally, a suggestion to add some e-commerce features to improve functionality could be considered.

Table 5 Detailed results of functionality preferences after computing the corresponding aggregated criteria function for Museum Negara site

2	Functionality	Scores
2.1.1.1.	Scoped search (collection sub-site)	0
2.1.1.2.	Global search	100
2.2.1.1.	Level of interconnection (for a collection sub-site)	0
2.2.1.2.1.	Indicator of path	0
2.2.1.2.2.	Label of current position	0
2.2.2.1.	Coupling among sub-sites	70
2.2.3.1.1	Contextual control permanence	70
2.2.3.1.2.	Contextual control stability	70
2.2.3.2.1.	Vertical scrolling	0
2.2.3.2.2.	Horizontal scrolling	0
2.2.4.1.	Link title (link with explanatory help)	0
2.2.4.2.	Quality of link phrase	80
2.3.1.	Content relevancy	80
2.3.2.	Link relevancy	80
2.3.3.1.1.	Shopping basket facility	0
2.3.3.1.2.	Quality of product catalog	0
2.3.3.2.	Secure transaction	0
2.3.4.1.	Image size indicator	0
2.3.4.2.	Zooming	0

Table 6 Quality characteristic outcomes and characteristic preferences for Museum Negara Malaysia Web site

Characteristic	Negara Museum Site
Functionality	32.303
Usability	65.487

7 Conclusion

Web site application is growing rapidly and widely used in commercial sectors. As such, we need to uncover a way to design and produce quality Web site's, taking into account several different attributes or product/process modeling system for quality assurance. This would help us to understand, evaluate, predict, and improve the quality of our Web site.

In this paper, we used a systematic and quantitative engineering-based approach to evaluate Web site quality characteristics and global preferences. We have arranged the Web site in the hierarchy of quality characteristics and quantifiable attributes following well-known international standards and guidelines.

The used requirement decomposition framework is relatively easy to comprehend and also flexible, allowing deletions, additions, and modification of its elements. And, we used the LSP to model aggregation criterion functions, which is used to evaluate the simultaneity, replaceability, neutrality, and symmetric and asymmetric

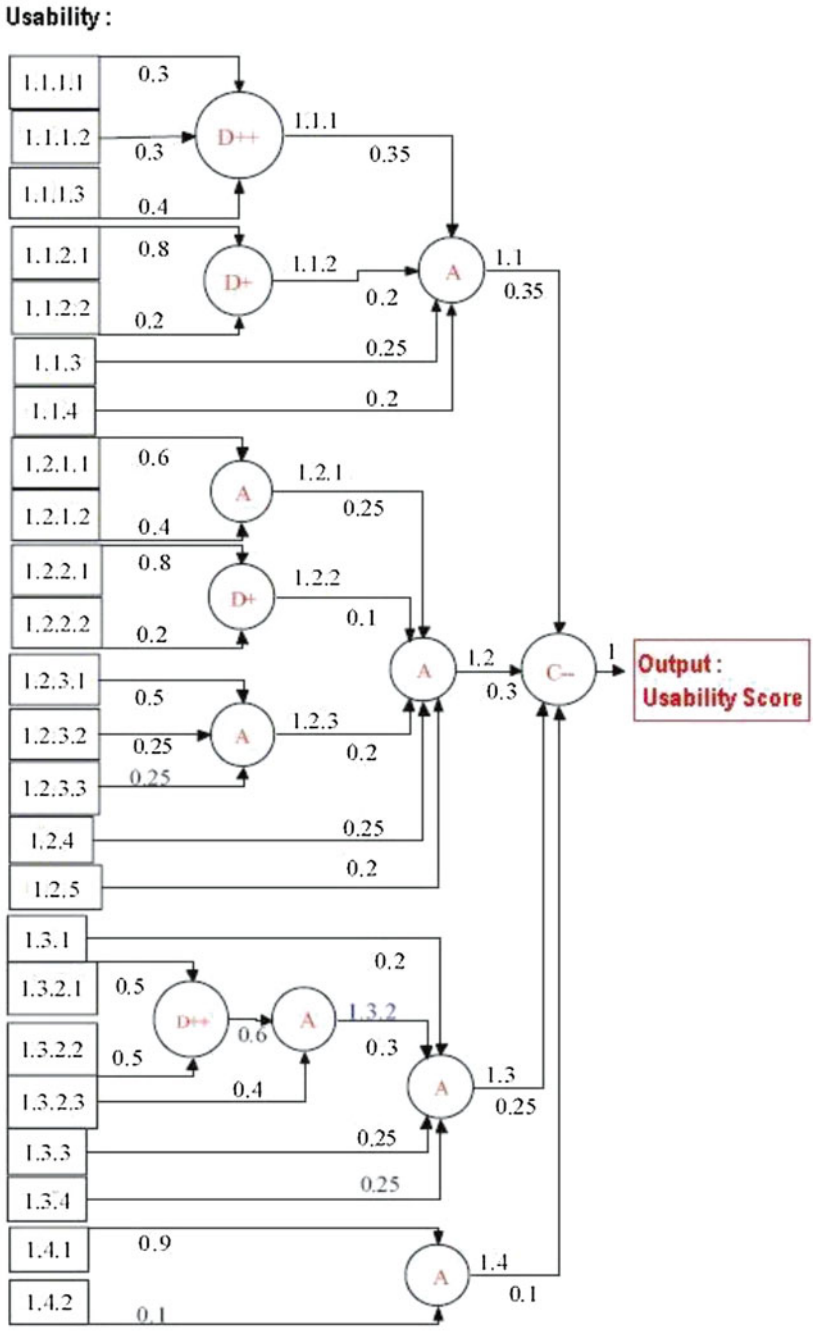

Fig. 4 Partial logic aggregation for usability

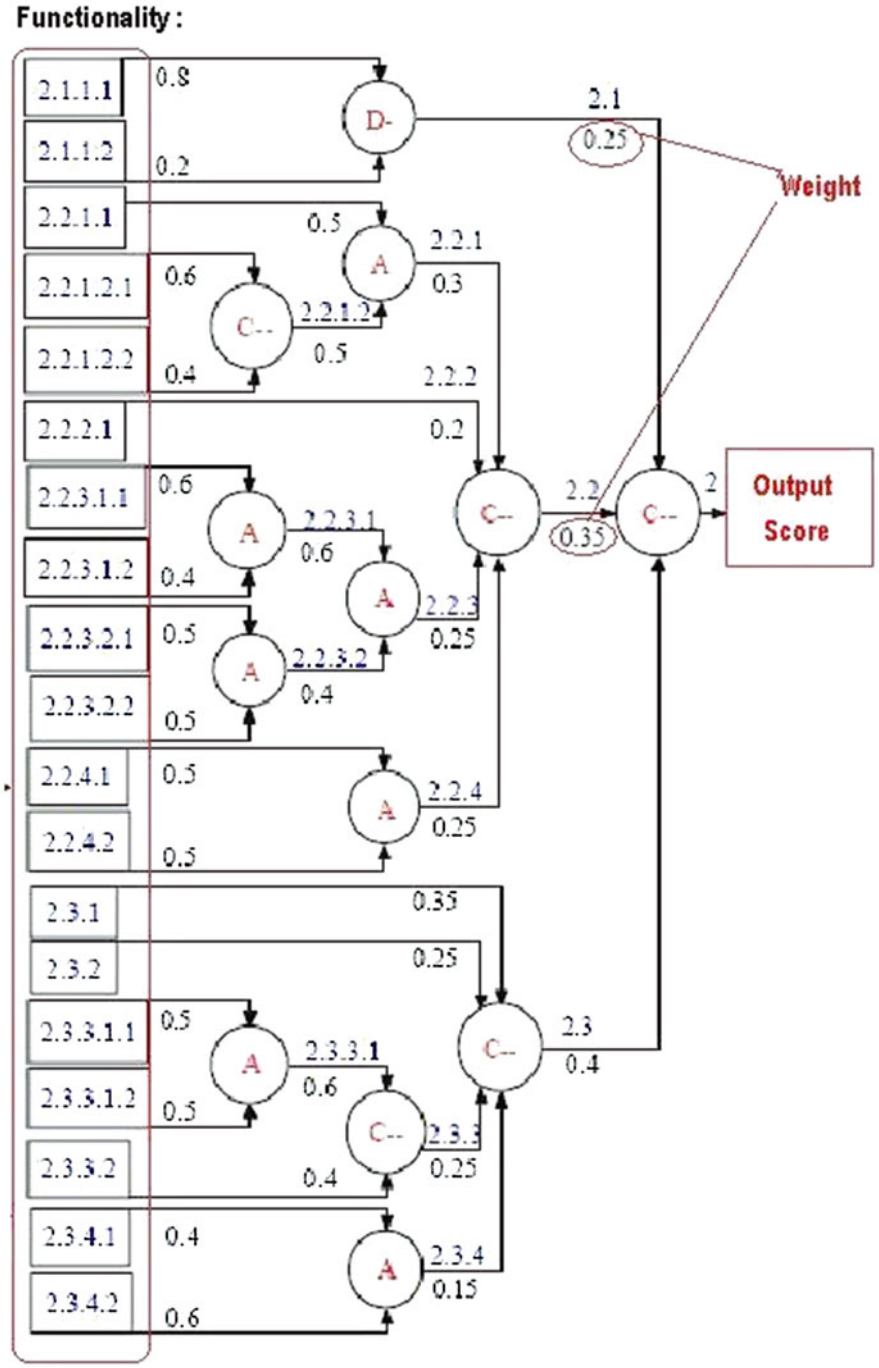

Fig. 5 Partial logic aggregation for functionality

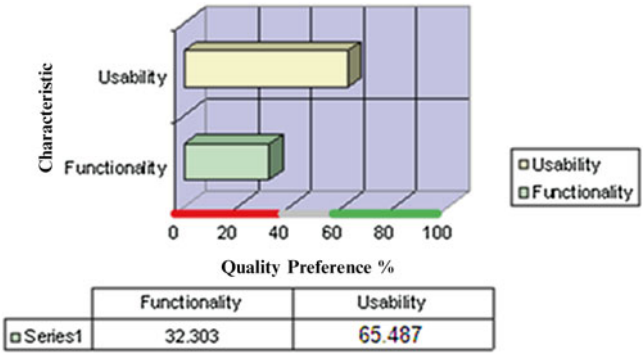

Fig. 6 Degree of the satisfaction of functionality and usability characteristic Museum Negara Malaysia

attribute relationships using logic aggregation operators based on weighted power means. The quality preference scores were generated to define the level of satisfaction. As a general conclusion, further enhancement must be carried by the Web development team to improve the quality of the Web site under evaluation.

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