Improving Teaching and Learning in Southeast Asian Secondary Schools with the Use of Culturally Motivated Web and Mobile Technology

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Abstract. Improving and stimulating teaching and learning are an interesting topic among educational researchers. As technology advances and with mobile technology and the Internet being used widely, it has become a vital tool for knowledge gathering and information sharing. It can foster new directives for teachers and stimulate the minds of learners, improving learning outcomes. However, the process of this triangulation of interaction has been overlooked in the Southeastern Asian region and requires an in-depth study into its culturally diverse background to identify its core problems and benefits. We propose Student Motivated Integrated Learning & Education with culture (SMiLE c) model in order to integrate education with web and mobile technology with an emphasis on Asian learning culture to promote active learning reduce overall costs and improves student learning outcome. We illustrate how this model can be implemented in Southeast Asian schools to improve teaching to suit students' learning style during lessons through an alert system and motivates student to participate in discussions which can be used by the institution to identify student's skill set early in the learning process.

Keywords: Mobile education · Education with social media · Technology and education · Biometric and education · Technological and pedagogical · Smart learning · ICT in southeast Asian schools · Culture and pedagogical approaches

1 Introduction

For more than a decade, technology has been a tool for success in every industry. The diversity of technology advancement has projected a new era of science and technology development in which technology developers are inspired by innovating and improvising technology features. Integration of the Internet, social media, web 2.0 and mobile devices are the current focus for industry players in this modern digital age, thus harnessing the power of social media and web technologies to advance their knowledge and businesses to the next level [1].

Proper technology integration guides students toward a better understanding of all concepts taught in class. It boosts student capacity, motivates students, increases student performance, amplifies and guides the cognitive process of learners [2].

K. Kim and N. Joukov (eds.), *Information Science and Applications 2017*,
Lecture Notes in Electrical Engineering 424, DOI 10.1007/978-981-10-4154-9_75

However, technology integration process in the education industry is challenging due to the constantly changing nature of technology. Ravenscroft argues that "we cannot truly transform educational practice for the better through using new technologies unless we examine the roles the computer can play in truly stimulating, supporting and favoring innovative learning interactions that are linked to conceptual development and improvements in understanding" [3].

Measuring students' progress and the learning outcome requires a systematic and gradual update for the educators in identifying issues with delivery in a progressive manner. Social media can facilitate the creation of Personal Learning Environment that help learners to share results of learning achievement and participate in collective knowledge generation [4].

The underpinning factor for student excellence is motivation. Motivated students perform better in class and ultimately improve learning outcomes. Adopting technology in education and streamlining knowledge attainment are inimical for schools. Modifying the education curriculum with the essence of technology requires intense study, which necessitates the optimization of features for an optimal learning outcome as well as identifying cultural resistance.

Our proposed method includes a background survey on literature on the applications of ICT in education. The result identifies the efficiency and deficiency in technology application and approaches in the Southeast Asian education industry. The significance of the result proves the differences between Western and Asian culture in teaching and learning and Asian teachers who do not understand the potential of technology. These deficiencies provide the foundation on a proposal for an integrated learning model for teachers who can identify students learning style during lesson and motivation on student participation due to cultural barriers.

The rest of the paper is organized as follows. Section 2 includes literatures which are categorized in ICT applications; Learning style and culture and Approaches. Section 3 provides discussion on the analysis and findings and the result is illustrated in a diagram. Section 4 identifies the proposed model and implementation approach and Sect. 5 concludes the paper.

2 Background and Survey on ICT in Education

In order to address the problems faced by teachers in using the right technology and student motivation during lessons with cultural issues that we stated, we have conducted a systematic survey of eighty (80) recent research articles. We briefly summarized the main themes and trends in this section, and the meta-analysis results of the survey are discussed in Sect. 3.

2.1 ICT Applications

Wastiau's study attempts to determine the optimal usage of mobile devices under certain technical and organizational conditions. The findings show that teachers who are confident in their digital skills and positive about ICT's impact on learning organize more

ICT-based activities with their students and confident and supportive teachers are needed to use the ICT infrastructure effectively to understand its potential [5].

Clark's study was designed to explore learners' perceptions and their experience of technology-mediated activity in school. A mapping study was used to explore these technologies and their use in greater detail with relation to technologies, practices, and context. There was evidence in Clark's study that few learners use these technologies with a high level of sophistication and institutions and teachers do not fully understand their potential benefits [6].

Spires' study was focused on students' perspectives of school and the use of technologies during school activities. The results show that students want the school to be aesthetically a pleasing environment that inspires and motivates them to learn and achieve with creative and ubiquitous use of technology. They find that learning is more fun when they get to use technology [7].

2.2 Learning Style and Culture

Tweed assessed whether Western-influenced students approach to learning more by questioning, evaluating and generating ideas compared to Chinese-influenced students. The findings from Tweed's study suggest that Western and Chinese-Canadian students have a more Socratic approach to learning compared to Asian-born Chinese students. The Western students were more likely question their instructors publicly. In contrast, Chinese-influenced students were more passive learners [8].

Liu's study was to find "a negative attitude toward participation" among students in Hong Kong Polytechnic University. The survey results show that 43% of students feel uncomfortable speaking in English as they lack practice. Students' had inadequate opportunities to practice spoken English and they adopted passive roles in the classroom [9].

Hofstede's study identified four dimensions: power distance, uncertainty avoidance, individualism versus collectivism and masculinity versus femininity. Hofstede's study on dimension shows that the largest universal shift is individualism and showed divergence among the countries rather than convergence [10].

2.3 Approaches

Cain used audience response systems (ARS) as a tool to aid faculty members in engaging and interacting with students. This tool allows instructors to pose questions to students and receive immediate feedback. Students' immediate feedback via ARS assist instructor to allocate more time on topics of which students lack an understanding. The results from Cain's study show that almost every student ($n = 110$) responded that ARS usage helped them maintain attention, and 98% ($n = 109$) felt that discussions stemming from the ARS were beneficial [11].

Joyce used remote-sensing computer-aided learning (RSCAL) to facilitate students' active engagement with foundational knowledge & skills, which was responsive to newer pedagogical perspectives and emerging learner needs. RSCAL incorporates video, animation, narrations that align with lectures, interactive play and quizzes that

appeal to different styles of learners, such as auditory- and visual-style learners. The system facilitated students' learning and engagement with materials extremely well [12].

3 Analysis and Finding

We did the survey in the previous section in order to find the efficiency and deficiency of technology (mobile technology, social media, cloud services & E-learning application) use among students, teachers, schools and government. Figure 1 summarizes the result in a wheel. Technology usage and acceptance level in secondary education were categorized using the four main factors: students, teachers, schools and government. The outer layer specifies the deficiency in each section, and the second outer layer specifies the efficiency of using technology in the classroom. The cluttered area of efficiency in students' use of technology indicates the promising features students benefit from in classroom learning. It shows the positive change and influence of using technology in the learning domain. However, the cluttered area in the teachers and schools sections is a deficiency and indicates the lack of the use of technology in the teaching domain and practices and policies supported in the schools that will fail to facilitate the positive integration of technology into the teaching and learning domain.

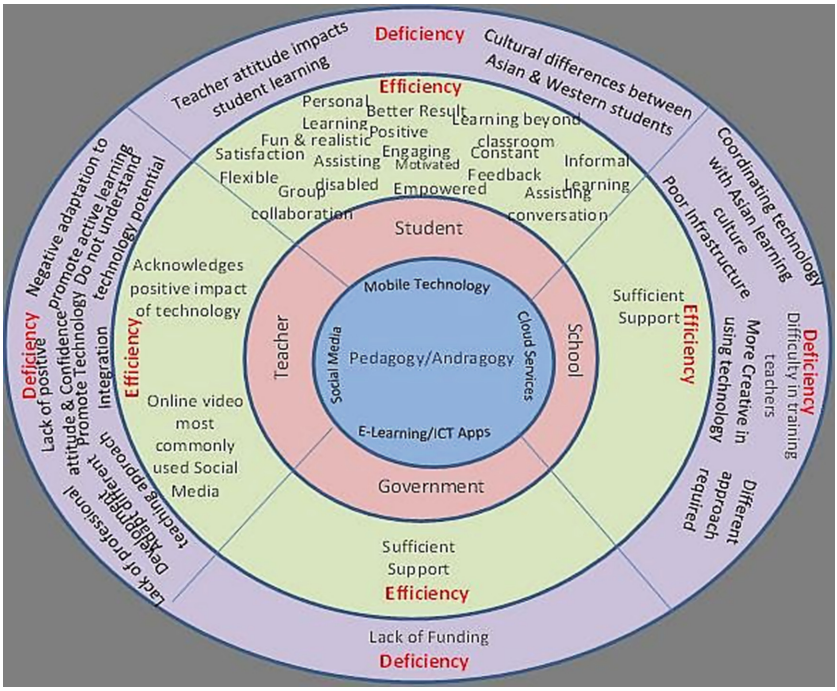

Fig. 1. Result summary

The presence of insufficient technology support in the teachers and schools sphere confirms students' inability to use high standards of technological tools and services and hence affects successful learning outcomes to achieve better results. The crux of the issue lies in the staff and organization's inability to understand the perfect match between teaching and technology, particularly by exploiting the anonymity that such technology entities could provide in the learning realm. One vital deficiency found in the schools domain, "D1-Coordinating technology with Asian learning culture," can be closely tied to the deficiency found in the teachers domain, "D2-Negative adaptation to promote active learning," "D3-Do not understand technology potential," and "D4-Adapt different teaching approach;" hence; these factors affects students' learning processes, as there are "D5-cultural learning differences presence between Asian and Western students" in the students domain that require profound attention and transformation of the teaching and learning approaches.

The current teenage generation (Gen Y) is more familiar with new technologies, and hence, using technology in the classroom seems to be a crucial factor in achieving effective results in teaching and learning. The identified barriers can be manifested into a positive approach if the right perspective is executed.

The five main deficiencies, D1–D5 were chosen as the base factors in developing the new model. These barriers were considered influencing factors for an effective learning outcome for the Asian region, and it is prudent to reflect upon these factors in future research. Institutions and teachers play a dynamic role in their manifestation, and a higher degree of study and analyses is required to provide a concrete foundation in the best interest of all parties and to move to the next phase of secondary education in the technological era. Keeping up with advancements is pivotal to improving performance and learning. The inseparability of modern technology and modern teenagers can be used to our advantage to motivate their educational journey; the education industry should consider the SMILE c: model an acronym for "Student Motivated Integrated Learning & Education with culture" to educate and motivate students using modern technology with appropriate cultural values for an effective teaching and learning approach: "giving them the tools to achieve what they want to achieve in an effective way".

The Table 1 below summarizes the factors considered for the model construction. The table shows the five deficiencies (D1–D5) identified as the main factors for deficiency and the second column shows the method to overcome the deficiency (OD1–OD5) and the third column highlights the features (F1–F5) that will be considered in the proposed model which tackles the deficiency.

4 Proposed Model and Approach

Figure 2 illustrates SMiLE C: model which is designed to motivate students for active learning during the lesson and for an effective learning outcome. Teachers can post questions during lessons from the smart library repository (F3), which consists of a pool of discussion questions and quizzes to promote interactive and active learning spontaneously (F2). Students post their answers using smartphones; this process attempts to

Table 1. Deficiency to features matrix

Deficiency	Overcome deficiency	Features
D1-Coordinating technology with Asian learning culture	OD1-Integrating Asian learning behavior	F1-features to identify weak or passive learners (Asian students)
D2-Negative adaptation to promote active learning	OD2-Promote active learning during lesson	F2-Post discussion questions to motivate active learning
D3-Do does not understand technology potential	OD3-Provide a smart learning model	F3-Easy to use model for teachers with readily available repository of questions/quiz
D4-Adapt different teaching approach	OD4-Changing teaching methods quick to adapt weak students	F4-Alert notification on the lack of students participation & teachers can change mode of teaching instantly
D5-Cultural learning differences presence between Asian and Western students	OD5-New model required for teaching Asian students	F5-Feature to identify and categorize students skills (passive & active) early for future planning

resolve issues for non-participative students (F1) who are not willing to voice their answers or opinions verbally during lesson. This process also draws students' attention and maintains student's attention span during lesson for an effective learning outcome. In this process, the teacher becomes more of a facilitator or motivator during the lesson. Students' answers are added to the smart repository, which can categorize students' special qualities and skills (F5) as artistic, creative, innovative and intellectual early in the learning process. Teachers and the school can use these reports for future planning and activities. The poll system detects the number of responses from students in real time, and the teacher receives an alert (F1) if the number of responses falls below the threshold level (number of students) with a graphical representation. The teacher can adjust the mode of teaching based on the number of responses received. If the response is low, teachers can switch to more interactive game-based learning or a short video on the topic to accommodate students' negative learning curves (F4). This system also delivers paperless technology to the education industry and hence improves the environment and helps cut back on costs.

A few secondary schools in Southeast Asia will be selected to test the SMiLE c: model. Teachers and school administrators will be briefed on the model, and an empirical test will be conducted during lessons. Teachers and students will be surveyed before and after the usage of the SMiLE c: model to discover the model's ease of use and its efficiency in producing an effective learning outcome. This model can be implemented using web and mobile technologies.

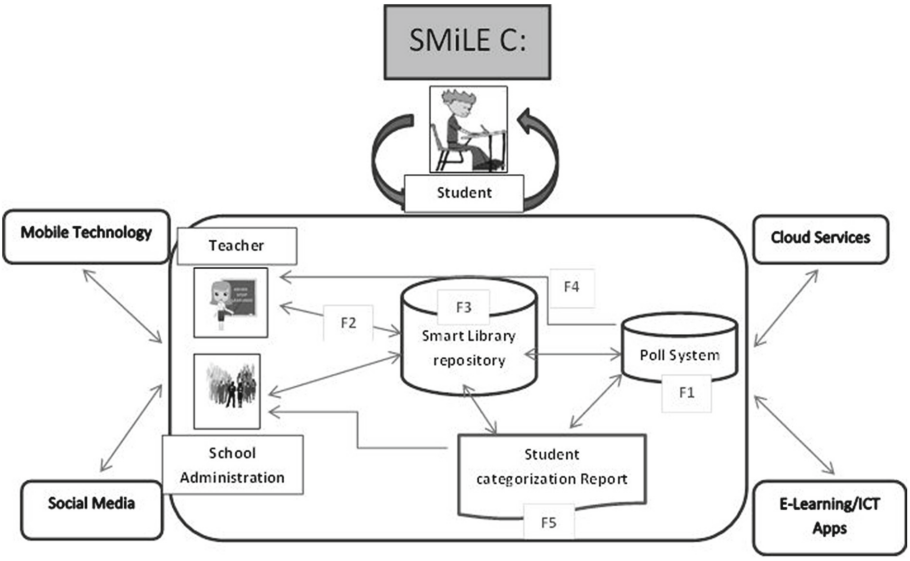

Fig. 2. SMiLE C:

5 Conclusion

Traditional classroom teaching requires a boost in energy and a vibrant atmosphere for active learning and to accommodate different learning cultures. As technology becomes a vital tool for knowledge gathering and information sharing, it can foster new directives for teachers and stimulate the minds of learners during the lesson, improving the learning outcome. The analysis of SMiLE c model shows that an integrated system is required for teachers to simplify their teaching and learning domain which can identify the lack of student participation and to accommodate student learning style during lesson for an effective learning outcome. This can be an integral part of student motivation and effective learning in classroom education. The features of SMiLE c: are efficient for immediate feedback in real time for teachers to understand students' learning progress; the model identifies types of students early and categorizes students' expertise level for future planning and activities. It promotes active learning, and most importantly, it reduces overall costs and improves student learning outcomes.

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