Internet Based Peer Assisted Learning: Current Models, Future Applications, and Potential

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Tairan Kevin Huang, Jin Cui, Corinne Cortese, and Matthew Pepper

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Abstract

Peer Assisted Learning (PAL) is recognized as an effective academic support program designed to assist students' learning needs. At the tertiary level, universities in Western countries have developed and implemented various

T.K. Huang (✉)
School of Accounting, Economics & Finance, Faculty of Business, University of Wollongong, Wollongong, NSW, Australia
e-mail: thuang@uow.edu.au

J. Cui
School of Accounting, Economics & Finance, University of Wollongong, Wollongong, NSW, Australia
e-mail: jcui@uow.edu.au

C. Cortese
School of Accounting, Economics and Finance, Faculty of Business, University of Wollongong, Wollongong, NSW, Australia
e-mail: corinne_cortese@uow.edu.au; corinne@uow.edu.au

M. Pepper
School of Management, Operations & Marketing, University of Wollongong, Wollongong, NSW, Australia
e-mail: pepper@uow.edu.au

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forms of PAL programs catering for students across disciplines, commonly targeting transitional subjects which are perceived to be difficult. Studies have demonstrated that PAL programs positively contribute to better student performance and higher student retention rates.

However, there has been relatively little discussion on how new technological trends can be applied to extend the PAL platform in order to suit the evolving student lifestyle and changes in learning behaviors. In this chapter a number of models for internet-based PAL are discussed and evaluated. The chapter also outlines some of the technological and other requirements for the establishment and maintenance of these internet-based PAL programs. Finally, an evaluation of the potential outcomes is presented. The discussion highlights that internet-based PAL programs can be used as an instructive complement to existing face-to-face PAL programs, further extending the benefits of student peer learning and social exchange with the convenience of mobile technology.

1 Introduction

Catering for students' educational needs is a key success factor of higher education institutions (Wingate 2007; Molesworth et al. 2009; Stokes and Wilson 2011). For Western universities, the provision of learning and pastoral care to international students is even more important for the institutions' financial and academic performance (Sawir 2005; Arkoudis and Tran 2010). Driven by the marketization of the education sector, universities are now facing challenging ethical dilemmas when safeguarding academic integrity whilst at the same time protecting their own managerial business interests (Hemsley-Brown and Oplatka 2006; Newman and Jahdi 2009; Ross et al. 2013). In other words, universities are faced with decisions regarding the amount, scope, and access to academic support to aid students in their study. As a result, providing high quality supportive programs to students is an important step towards enhancing their learning experiences and addressing some of the pastoral issues that international students might experience in higher education institutions.

Peer Assisted Learning (PAL) is a student academic support program utilizing collaborative learning to enhance individual learning experiences and skills. PAL can be viewed as an alternative terminology (commonly found outside the USA) of the Supplemental Instruction (SI) model firstly developed by Dr. Martin at the University of Missouri-Kansas City (e.g., see Blanc et al. 1983; Arendale 1994). At present, various disseminations of PAL programs and models are implemented in higher education institutions across Western countries as an essential part of teaching and learning management, including the USA, Australia, Canada, UK, and South Africa. Traditionally, PAL programs often use face-to-face study sessions/workshops as the main delivery channels. With advances in technology and evolving student lifestyles, some institutions have begun to develop and implement internet-based PAL programs as supplements to face-to-face study sessions (e.g., UMKC's Video-Based Supplemental Instruction approach).

This chapter provides a review of PAL programs and proposes some examples of internet-based PAL models to extend the educational benefits of PAL programs. It aims to enrich the current understanding of PAL philosophy, highlighting some of the potential benefits and trade-offs that internet-based and future mobile PAL programs could bring to the higher education sector. Case studies of both formal and informal internet-based PAL programs are investigated and evaluations of the pros and cons of possible models are provided.

2 Background

2.1 The Philosophy of Peer Assisted Learning (PAL)

The PAL program utilizes a peer-led group to provide additional academic assistance for students in addition to formal face-to-face teaching hours (lectures, tutorials, workshops, or seminars), aiming to assist students achieving positive results. Facilitated by senior students (commonly referred to as Leaders) who have excelled in the subject during previous semesters, PAL provides opportunities for participating students to strengthen their knowledge by actively being involved in group learning focused on material review and practical problem solving (Sole et al. 2012). The recognized benefits of participating in the PAL program for students include better engagement with the university (van der Meer and Scott 2009), better connections with other students (van der Meer and Scott 2009; Longfellow et al. 2008), improved self-concept and enhanced learning behavior (Ginsburg-Block et al. 2006), and the notably observed improvement in academic performance (McCarthy et al. 1997; Parkinson 2009; Malm et al. 2011; Devine and Jolly 2011). The program hence benefits the institution facilitating the PAL program via positive impacts on student retention (Etter et al. 2001; Hensen and Shelly 2003).

PAL programs traditionally target challenging subjects, commonly observed in the discipline of Engineering (Malm et al. 2011), Mathematics and Chemistry (Parkinson 2009; Devine and Jolly 2011), and Medical Studies (Knobe et al. 2010; Yu et al. 2011; Sole et al. 2012). In current development, PAL has incorporated commerce subjects as the commerce subjects can be challenging for students (Minnaert et al. 2011; Zraa et al. 2011; Calkins 2012). For international students, the major benefits of participation in a PAL program include more opportunities for engaging and interacting with domestic student peers and consequently become more accustomed to the host country culture and learning environment (Leask 2009).

The PAL philosophy draws from behavioral and social learning principles (e.g., Skinner's radical behaviorism and Bandura's social learning theory). For instance, Bandura's social learning theory is used to explain the rationale that high-achieving peer students are used as PAL leaders in study sessions. Benefits of being a PAL program leader include enhanced academic knowledge, improving interpersonal qualities, development of leadership and teamwork skills, networking opportunities, and added in curriculum vitae. Student leaders in PAL program are very sought after by employers across many industrial sectors. PAL program participants are

expected to imitate the leaders' behavior in learning that may lead to favorable outcomes. Thus, engaging in close contact with a role model (face-to-face) is considered an important influence on new learners' adoption of relevant learning behaviors and hence assists them to improve academic performance. However, Bandura (1977) states that observation of a live model is not always necessary for the behavior change stimuli to take place. Rather, verbal instruction and symbolic messages (including use of media and internet) can also be considered as vehicles for delivering modeling stimuli. As a result, a question arises as to whether the change from a face-to-face PAL model to a web-based non-contact PAL model will cause dilution of PAL programs' educational benefits.

2.2 Face-to-Face PAL Models

Traditional Model

Among the various dissemination forms of PAL programs implemented in higher education institutions, the most common model is face-to-face, regularly scheduled study sessions in which English is predominately used. In Australia, known universities which currently have implemented PAL (commonly referred as PASS – peer assisted study sessions) programs include the University of Wollongong, Monash University, Macquarie University, and the University of Sydney. These programs can be both institutionally funded and implemented, where the PAL leaders are employed and remunerated, or based on altruistic activities where students are recruited as voluntary contributors.

An archetypical PAL program is built on a peer-mentoring engagement between peer leaders and student participants. Using a "super group" approach, PAL study session aims to enhance students' learning by integrating course content focused study techniques and successful assessment/exam skills in a casual and relaxed atmosphere. The open dialogue engagement and social exchange between PAL leaders and students as well as between students studying in the same course are both influential factors to individual learning behavior change. The communication exchange between PAL leaders and participating students is considered to be less formal than in formal teaching contact hours, thus students commonly find themselves feeling more comfortable to interact and ask questions (Zaccagnini and Verenikina 2013). The PAL program provides opportunities for participating students to ask the questions they really want to get help on without the pressure of feeling their academic credibility is being put on the line. The intention being that, students can work in a positive, supportive, and productive team environment which enhances their communication and critical and creative thinking abilities. Of course, these positive attributes can be carried into other aspects of students' university life beyond PAL study sessions, or even further into their future career workplace.

However, it should be noted that the quality of actual academic content delivered in PAL study sessions are equally, if not more important than the positive influences on learning behavior change. Students who have experienced PAL study sessions

often comment that the revision of lecture and tutorial materials, recap of important theories/concepts, and more clarifications on assessment expectations make PAL programs very appealing to them. Although direct re-teaching is not the purpose of PAL programs, and PAL facilitators often emphasis that re-teaching in PAL study sessions should be strictly avoided, it has been stated that sometimes re-teaching cannot be avoided. In fact, in extreme circumstances deliberate re-teaching is needed to ensure the effectiveness of PAL programs (Cui et al. 2015).

Other Forms of Disseminations

In addition to traditional PAL programs, there are also learning support programs which embrace PAL philosophies operating in higher education institutions. These different forms of dissemination of PAL programs may or may not explicitly include PAL as part of the programs' title, but their management and operation are largely similar to traditional PAL programs.

Cui et al. (2015) discuss a Bilingual Peer Assisted Learning (B-PAL) program, which has been implemented in an Australian regional university as a means to assist the teaching of Chinese international students. Under the B-PAL program, bilingual workshops using Mandarin and English conducted in the end of each session across more than 20 subjects including accounting, finance, economics, and management in business faculty. Unlike traditional PAL programs that strictly avoid re-teaching, this B-PAL program deliberately includes re-teaching of academic content covered in lectures and tutorials in the workshop. The use of Chinese students' first language is an effective element influence their learning, as the bilingual instruction can enhance students' learning of academic content in a secondary language context by helping convey meanings (Cook 2001). It has other benefits including using first language to motivate students and scaffold learning (Turnbull and Arnett 2002), facilitating communicative features in group learning and enhancing student/teacher interactions (Ghorbani 2011), as well as helping to establish constructive social relationships and communicating complex meanings (Littlewood and Yu 2011).

The results of a qualitative analysis of Chinese students' experiences of the B-PAL program show that in addition to the recognized benefits of traditional PAL programs on students' learning, the bilingual approach provided extra value such as conveying meanings, sense making, and reducing exam/assessment anxieties. It should be noted that Cui et al. (2014) also reveal that students equally value the peer-teaching process and the actual academic content delivered in the B-PAL workshop, considering both as effective influential factors enhancing their learning experience and academic performance. In addition, the majority of Chinese students state that the academic content is extremely important. In fact they prefer for teaching materials to be distributed online pre or after the workshop. However, they also acknowledge that the face-to-face contact and two-way communication is necessary for them to make better use of the materials and gain a better understanding of the subject.

PAL programs were originally designed to target struggling subjects, not struggling students (Arendale 1994). However, there are also learning support programs

that utilize the PAL model to provide educational support to students with genuine learning difficulties (also referred to as students-at-risk). As an example, the Australian Department of Education, Employment and Workplace Relations administrates and financially supports the Indigenous Tutorial Assistance Scheme (ITAS), which is a program providing supplementary tuition to support eligible Indigenous students to study university award level courses (2010). The purpose of the ITAS program is to accelerate education outcomes for Indigenous Australians beyond those which could reasonably be expected from the mainstream and the providers' own financial resources alone. By offering regular face-to-face learning support delivered by a student leader, ITAS aims to improve the academic efficacy of Indigenous students in tertiary courses to the same levels as those for non-Indigenous Australians. Unlike traditional PAL programs where study sessions are often conducted in a one leader to many students format, ITAS programs generally rely on one to one peer-teaching to achieve its objectives. In this sense, the level of direct face-to-face contact and engagement is more significant in ITAS model.

Process or Content?

By examining both the traditional PAL model and the alternative forms of assisted study support, multiple benefits have been observed from different forms of PAL programs particularly on improving self-concept and learning behavior (Ginsburg-Block et al. 2006), hence notably improvement on academic performance (McCarthy et al. 1997; Parkinson 2009; Malm et al. 2011; Devine and Jolly 2011). Then it can be observed that a key question needs to be addressed before considering the development of an Internet based PAL program. This question is, *what is more important/valuable towards student learning, the peer mentoring/teaching process or the actual content/materials used in PAL study sessions*? It is obvious that an internet based PAL platform can have tangible advantages in connectivity and content distribution, but can internet based PAL programs offer similar environments for peer-to-peer communication and engagement which is needed for social learning to occur?

The key benefits for students to participate in a PAL program are two-folds. In addition to the engaging and collaborative learning environment, the distribution of PAL study session material should not be overlooked as well. Often there are some participants in the traditional PAL program remain quiet during the session and have no engagement with leaders. These participants' main motivation to join a PAL study session is to collect the teachings material distributed by the student leaders, rather than treat PAL program as an opportunity to interact with peers to enhance their knowledge and improve their individual study skills. Such passive learning behaviors result the "silent group" exist in PAL study sessions which merely follows the instruction of the PAL leader and seldom express their opinion or communicate with other student peers. In a face-to-face PAL session, these "silent group" sometime are forced by leaders to engage with others using various PAL teaching techniques. Now, with the development of information technology, Internet as an intermediate has been broadly used in higher education section with

the implementation of students' E-learning system, learning platform such as blackboard and mass email system. These developments allow students to access their students' profile and information at any time and any places as long as they connected to the Internet. The PAL program are under transition to Internet based PAL program. However, the techniques PAL leader often use in face-to-face study sessions will be hard to apply online.

The idea of using Internet based PAL program to assist teaching is still appealing. Unlike the traditional PAL programs have well developed and designed, Internet based PAL programs are often implemented as a trial. Similarly to the traditional PAL program rely on face-to-face peer mentoring, the key features of successfully implementing an Internet based PAL program are interactions and engagements of students. Then another question should be asked is to what extent the interactions and engagements are sufficient? Distributions of material or illustrations of examples do not count for interactions or engagements, particularly in the online environment. For instance, if the leader would like to demonstrate a step-by-step solution, it would be easier for a face-to-face PAL session to illustration, but difficult for an Internet based PAL session. The interactions and engagements require in-depth communications and real-time feedbacks between leaders and participants. In face-to-face PAL sessions, it is relatively easier easy to maintain a friendly learning atmosphere through casual conversation among leaders and participants, using body languages or other teaching facilities like white board or PowerPoint slides. It takes more time to for participants and leaders to know each other and further build up a friendly learning environment over an Internet based PAL session. This chapter goes on to discuss existing Internet based PAL programs, identifying current trends and commonly found issues.

3 Internet Based PAL Programs

At present, internet based PAL programs are run on a much smaller scale compared to face-to-face PAL study sessions and could be considered to be at a testing/pilot phase of development. A number of studies have reported on the schemes, implementation and preliminary results observed in pilot PAL programs (e.g., see Beaumont et al. 2012; Beckmann and Kilby 2008; Armstrong et al. 2011; Huijser et al. 2008). A variety of terminologies have also been used to describe the internet based PAL programs, including PAL-Fleximode, Off-Campus PAL Program, or Online PAL Scheme.

Initially, in order to cater for the growing needs of PAL programs from students off-campus or unable to attend scheduled PAL study sessions, video-based PAL programs are designed and implemented. For example, the University of Missouri-Kansas City (UMKC) initiated one of the earliest versions of Video-based Supplemental Instruction (VSI), which combines remote teaching of course content with SI study sessions (UMKC, n.d.). Teaching academics capture video recordings of their lectures. Trained facilitators, using the recorded lectures and the SI model, guide students through the learning process while emphasizing critical thinking and

study skills. Assessment is provided by the academics keeping the facilitator in the role as a peer supporter and not an evaluator. Although for such video based PAL programs, the presence of a peer leader is still needed in a face-to-face learning environment, it opened the potential for PAL programs to be shifted into cyber space.

Beaumont et al. (2012) establish some of the evaluation criteria for a successfully implemented Internet based PAL program, including the suitability of synchronous communication, student interests, and whether the standard PAL principles and approaches can be carried across to the online platform. Based on their case study of a pilot Internet based PAL program implemented in an Australian university, there are observable benefits such as flexibility, convenience, and higher students' confidence to contribute. These benefits are perceived by students who find it difficult to attend campus due to other commitments and perceive studies as their non-priority. Internet based PAL program benefit these students by offering opportunity to access the same study information as those on-campus students. The internet based PAL program also provides a platform for those generally shy students to unveil themselves online without any concerns of embarrassment in a high-contact study sessions.

In contrast, a number of drawbacks were experienced, such as poor content coverage, causing of distractions, and most importantly, leading to an impersonal nature of delivery which contradicts the philosophies of PAL program. The software and connections lag issues lead to longer waiting processes when leaders presenting the materials and providing feedback to participants. Finding also suggests that participants' responses towards questions were procrastinated due to the lack of visual clues and the online environment actually hindered leaders' ability to observe participants' reactions (Beaumont et al. 2012). In additional, for International students who are from non-English speaking country, they are reluctant to express their opinion cause of lacking proficient language skill. It takes more time for them to post a response, which make the student leader's control of session time more difficult. The "invisible-to-each-other" relation between leaders and participants may also become a discouraging learning environment, as the communications are found to be impersonal, and it is difficult for the students and leaders to build trust and friendship. One of the benefits perceived in PAL program is that percipients can observe or connect role model students who have demonstrated their learning behavior through PAL program and are motivated through ego-enhancement. The effect of role models underpinned by the social learning theory can promulgates to participants to model, imitate, and adopt the behavior themselves (Bandura 1977; Wenger 2010). Based on the limitation identified, the effectiveness of using peer leader as role models to influence students' learning behavior may be reduced when programs are delivered online.

Similarly, other studies also state that although student responses were generally positive on internet based PAL programs using online communication and collaboration tools (such as Google Docs, MSN Messenger, and Virtual Classrooms), researchers found that participation was hard to maintain and peer leaders often felt high pressure to moderate online group discussions (Beckmann and Kilby 2008;

Armstrong et al. 2011; Huijser et al. 2008). Thus, the recruitment, training and development of peer leader for internet based PAL programs is essential for the future success of such programs. The success of enabling students to gain multiple benefits from PAL programs depends the teachers' own proficiency in languages, experiences, and cultures (Skalicky 2008; Cui et al. 2015). In addition to these qualities, other positive characteristics are expected from an effective online PAL program leader, such as the ability to remain an authoritative figure to regulate communications and discussions as well as good interpersonal skills to deal with unfavorable student online behaviors (such as causing distraction and inappropriate language use). In relation to the selection of online platform, it appears that the use of multi-people chatting software is not a favorable option as it is highly likely participating students will start an irrelevant/distracting discussion. Use of discussion forums is a better alternative, as the leaders can better keep in track with the posted discussions and the program coordinators have opportunity to study the communication process at a later time to identify potential issues for improvement.

It needs to be clearly stated that the relatively low participation/attendance rate in internet based PAL programs recorded in the aforementioned studies is of significant concern. In earlier studies regarding PAL programs, results indicate that some PAL program participating students use the program as an alternative to formal teaching hours, hence causing the institutions and faculty members to express a certain degree of concern. At the same time, in many scenarios the academics do consider that PAL programs provide the "last threshold" for some students who have very low study motivation and whose academic performance will likely drop even further without access to a PAL program. If a PAL programs' switching from a face-to-face model to an online model cause lower attendance/participation, then the value of a PAL program will not be fully realized, and the students' performances are at risk. Consequently, if an institution plans to establish an online PAL program, it is important that an enduring online learning community must be established and maintained among the faculty, PAL leaders, and students. The key features necessary to achieve such an online learning community identified in earlier studies include making learning interactive and collaborative, creating student-centered approaches, focusing on reflective thinking, and stimulating learner interest through the use of multimedia techniques (e.g., see Maor 2003; Wang et al. 2003; LaPointe and Reisetter 2008; Liu et al. 2010). It can be seen that in addition to the technological requirement, humanistic qualities in teaching and learning are also important criteria for building an online learning community and hence realizing the potential of internet based PAL programs.

4 Future Development of Internet Based PAL Programs

Although the current status of internet based PAL Programs is far from being an effective learning support program due to the aforementioned issues, there is promising future development potential with the advancement of web communication technologies and applications. For instance, Friedrich et al. (2011) illustrate

the characteristics and learning behavior of a student living in a not-so-far future year of 2020, stating that the student "can attend lectures, browse reading materials, do research, compare notes with classmates, and take exams – all from the comfort of his apartment," all of these functions are utilized through his primary digital device (PDD). The student in this story represents what the author refers to as "Generation C," who are always "connected, communicating, content-centric, computerized, community-oriented and clicking" (Friedrich et al. 2011, p. 3). In the not-so-distant future, Generation C will constitute the major cohort of service consumers, including education. At present, organizations like the Open University Australia offer more than 100 degrees for students to choose from, although in most cases the teaching is delivered through the internet, students still have to sit formal exams in selected venues in order to complete subjects and degrees. What Friedrich et al. (2011) described can be considered as the next stage of virtual universities, where collaborative research and assessment can also be included in the online activities rather than just teaching content distribution.

Another key feature associated with the "Generation C" cohort of students is their inseparable relationship with social media. In addition to sharing information, ideas and things people discovered, social media platforms have also become the main broadcast channel by which many people learn about products and services (Anderson et al. 2011). Core elements such as community-based marketing and tailored applications are now widely used by both businesses and non-for-profit organizations to stay connected with customers in order to achieve higher sales expansion and customer retention. In previous studies, the issue of distraction is often observed when social media is used as a platform enabling online PAL sessions. However it can be expected that in the future, more study focused social media applications will be developed. Unlike an ordinary social media platform, PAL program specific social media applications require more administrative and management effort to ensure that content sharing and communication are study related and meeting the required standard of teaching quality. Any form of distraction should be controlled and minimized in order to obtain better learning experience. Once again, this requires comprehensive training provided to leaders facilitating the internet based PAL programs, including how to introduce ground rules in the early stages of a program, establishing authority and clearly outlining students' responsibilities during online PAL programs. Mutual respect between the online PAL program leaders and participants is necessary to achieve more teaching and learning outcomes from the online PAL program.

Along with the development of web servers and broadband infrastructure, virtual worlds have now become widely used in education. The interactive nature and game-like characteristics of virtual worlds has strong appeal to students who are interested in online video gaming, whilst at the same time, they are capable of delivering rich and dynamic social interactions and collaborations between vast numbers of users (OECD 2011). Games such as *Second Life* have been used as a platform for online teaching, showing strong potential in the visualization of academic content and demonstrating its effectiveness (Burgess et al. 2010).

Now with more than 200 universities establishing a presence in *Second Life* it can be seen that a much larger scale of collaborative online teaching and learning program can be realized through the application of virtual worlds. However, other issues such as content ownership, privacy, as well as addiction must be taken into consideration.

In order to control and maintain the quality of online PAL learning and avoid issues such as digital data ownership and privacy, it is recommended that education institutions should maintain their own online PAL programs to complement their formal teaching and on-campus face-to-face PAL programs. As previously discussed, the two important criteria for successful implementation of online PAL programs are establishing an online learning community and training of online PAL leaders. If these conditions are met, the online PAL program can help enhance students' learning, especially for those who have limited study time on-campus and need to access learning support via the internet during self-study time. It is important for the institutions to see the benefit of providing internet based PAL programs, as the initial cost of technical requirements and leader training appear to be higher when compared to a face-to-face PAL program. However, if what Friedrich et al. (2011) described becomes reality in the near future, whereby online teaching and learning becomes the core function of education institutions, earlier investment in online programs can provide the institutions valuable experience and accumulation of both technical and human capital to provide effective online learning programs.

5 Structure of Implementation

The implementation of PAL programs and internet based PAL programs in a higher education institutions can have a number of structural arrangements. Figure 1 illustrates some of the arrangement can be made to utilize an internal based PAL program to enhance students learning. The use of online or mobile teaching and traditional on-campus PAL program to support formal contact teaching are well discussed in literature and other chapters of this book; this chapter focuses on discussing how internet-based PAL programs can provide additional educational benefits to suits different student learning needs.

The first possibility is to implement an online addition to the existing on-campus PAL programs to support formal teaching (A + B in Fig. 1). As discussed earlier, some students find attending on-campus PAL programs can be difficult due to timetabling issues or work conflict as these traditional PAL programs are often scheduled in regular school hours. In this scenario, including an online session will benefit these students, particularly the part-time students who also are employed. For the institution, integrating on campus and online PAL programs offers learning potential for both the program coordinators and the PAL program leaders. This structure is suitable for large education institutions with its own PAL program coordinating unit and are interested in the research and development of PAL

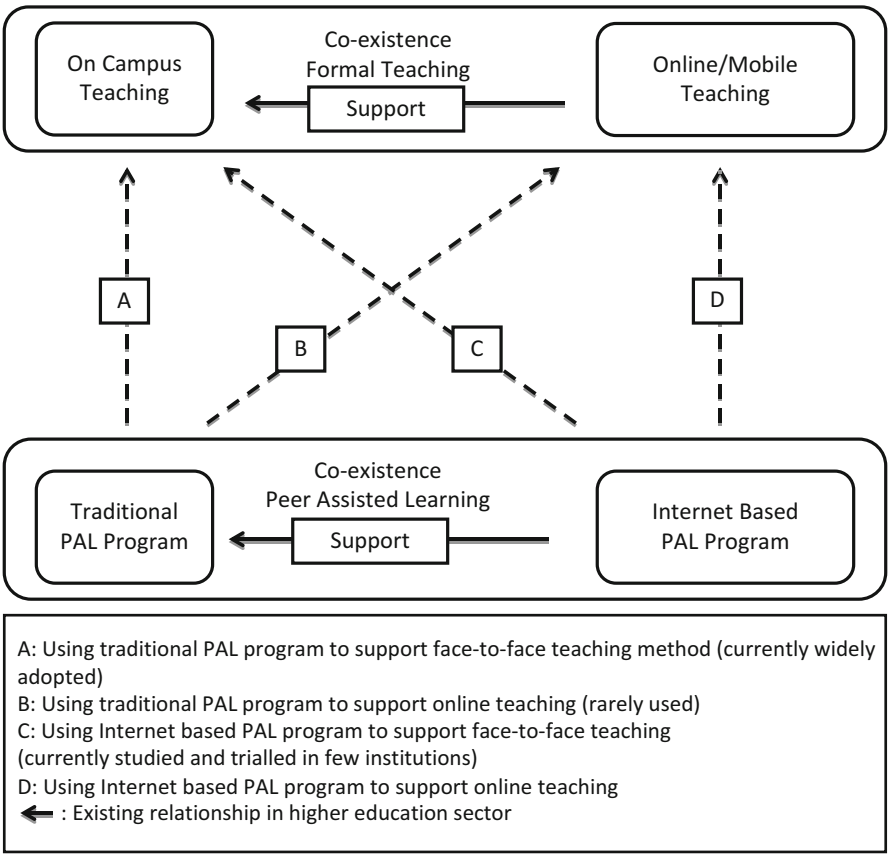

Fig. 1 Implementation structure

programs. What is important for the PAL program is to identify the transferability of the content and teaching style when the program is conducted online, actively seeking feedback from leaders and participating students to accumulate know-how and expertise.

In contrast, for smaller campuses or satellite campus where it is less cost efficient to establish on-campus PAL program, starting with an online PAL program can be a useful strategy to identify whether PAL approaches enhance students learning in a smaller campus environment and reduce the perceived learning gap between students in remote campuses and students in main campuses (D in Fig. 1). This implementation will be more useful when online teaching is the main education offered in these campus (lecture and tutorials are delivered through video conference or recorded media), as it is often found that remote campus students do require additional learning support due to less connectivity and engagement with teaching

personnel in the main campus. Therefore, the internet based PAL programs used to support off-campus students or satellite campus students need to embrace effective online education pedagogies, ensure the program is relevant, interactive, collaborative, and most importantly, give learners the flexibility to control over their own learning (Bonk 2006).

6 Evaluation of Effectiveness

As discussed in the previous section, the application of internet based PAL program potentially enables higher education institutions to further narrowing down the learning quality gap between on-campus and online/off-campus students. However, the quality management and assurance of the online PAL programs can be a challenging issue, as the evaluation of online educational program effectiveness is more complicated than the already difficult process of evaluating on-campus programs.

Studies concerning the effectiveness of traditional face-to-face PAL programs often focus on measuring the improvement of students' performance, claiming that by participating in PAL programs students generally perform better in struggling subjects (McCarthy et al. 1997; Parkinson 2009; Malm et al. 2011; Devine and Jolly 2011). Similarly, Cui et al. (2014) also reveal that students who attended Bilingual PAL workshops obtained better average marks than those non-attenders. In addition, other studies use student feedback to reveal how their learning behavior changed under the positive influence of PAL programs. The impact of other factors (such as the subjects' difficulty, students' own learning efficacy and self-selection bias) are yet to be comprehensively investigated to evaluate to what extent PAL programs alone can contribute to better students' academic performance. Therefore, it is suggested that PAL programs are used as supplementary learning support rather than a standalone teaching delivery model.

The evaluation of effectiveness for internet based PAL programs has additional challenges and difficulties. Unlike a face-to-face PAL study session, students' attendance and participation in an internet based PAL program cannot be physically observed and recorded at ease. As a result, the correlation between program participation and academic performance may be misstated. Moreover, if the online PAL program focuses more on content distribution rather than teaching and learning engagement, issues such as spill overs may impact the program's overall effectiveness evaluation as there will be difficulties in distinguishing the positive contribution resulting from content and from the learning process. It is hoped that with more technologies enabling better synchronized communication and visualization there will be improved monitoring of students learning behavioral change during internet based PAL programs. The development of degree curricula, including teaching and assessment will also impact the future of internet based PAL programs.

7 Future Directions

To conclude, in this chapter the philosophy of PAL programs and its current offline and online models are discussed and the potential future development of internet based PAL programs are explored. Based on these discussions, successful implementation and effective use of an internet based PAL program requires the establishment of a genuine and enduring online learning community and provision of online PAL leaders who are capable of regulating and facilitating online study focused peer communications and engagement. Lastly, a comprehensive framework is needed for evaluating the effectiveness of internet based PAL programs in improving students learning.

The benefits of implementing an internet-based PAL program seem less appealing at present with the identified technical and nontechnical issues such as causing distraction, lagged response times, and an inability to obtain real-time feedback, hindering the full potential of internet based PAL programs to be fully realized. However, with future technological advancement and evolving students' online learning behavior, it is expected that the model can be further enhanced in order to cater the learning needs of "Generation C" students. Education institutions need to consider the associated cost and value contribution of implementing an internet-based PAL program and must endeavor to better understand students' attitudes with online teaching and learning in order to provide better support to their learning experience.

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