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Mobile learning in the Asia-Pacific region: Exploring challenges hindering the sustainable design of mobile learning initiatives

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Higher education institutions and government departments in the Asia-Pacific region have invested significantly in technological innovation to enhance educational delivery and redress inequality in access to formal education. As a result of the fast-paced growth of mobile adoption and mobile internet access in these regions, universities are able to leverage the affordances of mobile devices to offer greater flexibility to students. Despite the emphasis on enhancing technological capacity, there remains significant challenges to the effective adoption of strategies to integrate mobile technologies in learning and teaching. This article briefly explores 12 projects undertaken at different universities across nine countries. The projects were selected from 28 chapters submitted to an edited book on supporting the implementation of sustainable mobile learning initiatives in the Asia-Pacific region. The motivation and aims of each of the projects are compared and the primary challenges are explored at four levels of institutional stakeholders.

Keywords: Keywords: mobile learning, m-learning, sustainable innovation, Asia-Pacific region

Introduction

Educators and higher education institutions worldwide are under immense pressure to offer students personalised learning opportunities that enable tailoring of learning environments to meet the needs of individual learners. This is particularly true in developing countries where millions of people have been excluded from formal education. Around 45 per cent of the world's population of youth live in the Asia-Pacific region, which is one of the fastest developing regions in the world. Regional youth unemployment rates are, however, around 10 per cent, which is on average three times more than for adults (UN, 2010). Large numbers of young people in Asia-Pacific countries struggle with access to education and other resources, and transition between education and employment is one of the main obstacles facing youth in the region. The Asia-Pacific region also experiences a low level of enrolment in tertiary education, just 25 per cent in Central Asia, 26 per cent in East Asia and the Pacific and 13 per cent in South and West Asia (UNESCAP, 2010). Barriers to participation in education include large disparities between rural and urban areas, socio-economic inequality and exclusion of youth with disabilities (UN, 2010), as well as poor geographical and physical infrastructure (Dholakia & Dholakia, 2004). Female youth and youth from poor families, rural or remote areas, and ethnic and language minorities are the groups most likely to be excluded from tertiary and even secondary education. Long journeys from residential areas to schools are also cited as a significant barrier (UN, 2010).

The fast ownership growth rate and increasing sophistication of mobile technologies in the Asia-Pacific region, offer higher education institutions added opportunities to leverage the flexibility of mobile devices to support the educational redress of regional and socio-economic gaps in education provision. Currently the Asia Pacific region dominates the world's mobile industry with a third of the population using mobile devices to access the internet. This is expected to grow to half the population by 2020 (GSMA, 2015). In some metropolitan regions, mobile device ownership reaches over 100 per cent (Jeroschewski et al., 2013). Smartphones have more affordances to be leveraged for mobile learning, though levels of smartphone ownership as compared to feature phones remains relatively low across most of the Asia-Pacific (excluding Australia and New Zealand) (Farley& Song, 2015). Data collected by Pew Research indicates that in Malaysia, 89 per cent own a mobile and 31 per cent own a smartphone; in Indonesia, 78 per cent own a mobile and 11 per cent own a smartphone; and in the Philippines, 71 per cent own a mobile and 17 per cent own a smartphone. Predictably, smartphone ownership tends to be higher in countries with higher per capita income (Pew Research Global Attitudes Project, 2014). Mobile devices, in the form of smartphones, tablet computers, and in some cases even laptops, are widely

available and have the potential to provide greater flexibility and personalization of learning to students, regardless of location. Mobile devices have a number of advantages for learning and teaching in developing countries that include the ease of use of these technologies, widespread availability and greater familiarity than computer-based online learning systems (Motlik, 2008).

According to a report developed by Adkins (2013), there is currently a massive demand for mobile learning content in Asia-Pacific countries. At the same time, providers of mobile learning have value added services and are investing heavily in the development and provision of mobile devices, such as tablets and smartphones, preloaded with educational content such as apps, dictionaries and assessments. As a result, higher education institutions are competing heavily with these providers, particularly in rural populations where potential students are forgoing formal education for less expensive and more easily available options. Current initiatives to implement mobile learning at universities in Asia-Pacific countries are, however, frequently undertaken on a small scale or ad-hoc basis, with few initiatives moving beyond merely providing content to encouraging creativity and self-directed learning (So, 2012). Additional support for institutional leaders in these organisations is required to support the development of mobile learning initiatives that can be sustainably integrated into current strategies, policies and procedures as well as meet the learning and teaching needs of educators and students. This paper presents preliminary findings from a research study aimed at addressing this gap.

Methodology

The authors are presently compiling an edited book consisting of 28 chapters to be published by Springer in 2016 titled: "Mobile Learning in Higher Education in the Asia Pacific Region: Harnessing Trends and Challenging Orthodoxies" (Murphy, Farley, Dyson & Jones, in press). The book consists of discussion papers and case studies submitted by educators from 18 countries within the Asia-Pacific region including; Australia (including regional and remote areas), Cambodia, Laos PDR, China, Hong Kong, India, Indonesia, Japan, Republic of Korea, Malaysia, New Zealand, Pakistan, Pacific Islands, Papua New Guinea, Russia, Samoa, Singapore and Vietnam. Each of the case studies focused on the implementation of a mobile learning initiative either at a pilot level (one or more courses) or at an institutional level as a cross-university strategy. At the conclusion of each chapter case study, authors discussed the challenges and implications of their studies at one or more of four institutional levels (Murphy & Farley, 2012):

1. Organizational: The institutional policies and practices that currently support or hinder the implementation of mobile learning initiatives.
2. Technical: The current infrastructure assets and challenges as well as standards and protocols that will impact on the success of mobile learning initiatives.
3. Pedagogical (teaching): Strengths and inefficiencies of current mobile learning practices and pedagogies as well as the barriers and critical success factors that impact on educators adopting mobile learning initiatives.
4. Pedagogical (learning): Expectations of mobile learning and insight into current formal or informal mobile learning practices of students to identify gaps in current services and student learning needs.

During the two-year period it took to compile the book, the authors of the chapters worked closely with the editors through an iterative process consisting of peer review workshops, detailed feedback from the editors and external reviewers to ensure that the chapters aligned with the aims of the book and clearly identified the limitations at each of the organisational levels discussed. Interviews were also carried out with 16 authors using a semi-structured interview guide to gain detailed insight into the pedagogical foundations and unique issues experienced during the implementation of each project. The aim of this exercise is to inform the development of a Mobile Learning Evaluation Framework (Murphy & Farley, 2012) for supporting the sustainable implementation of mobile learning initiatives within the Asia-Pacific region. The findings from those interviews will be discussed in detail elsewhere. The purpose of this article is to present preliminary insights from 12 case studies representing nine countries within three major regions of the Asia-Pacific; East and North-East Asia (Japan and the Republic of Korea), South-East Asia (Laos PDR and Cambodia, Indonesia, Malaysia, Singapore) and Oceania and the Pacific Islands (Samoa and Fiji). The three regions that had the highest number of submitted case studies were selected for inclusion in this stage of the research. All case studies that involved mobile learning in higher education institutions in the three selected regions were retained for the preliminary analysis. Key learnings at each of the organisational levels and the potential implications of for higher education institutions considering the implementation of mobile learning at various levels are discussed.

Asia-Pacific Mobile Learning Case Studies

The case studies presented in Table 1 demonstrate a very preliminary overview of the mobile learning landscape in the Asia-Pacific and do not constitute an exhaustive account of all mobile learning initiatives occurring in these countries. The variation in scale of implementation, however, demonstrates that a number of universities are investing significant time and resources in developing solutions to support and enhance mobile learning platforms for their students. At least three universities have developed institution wide mobile learning portals to provide students with access to mobile learning content in various forms including courses and administrative activities. Two case studies presented mobile apps that were developed to support learning and teaching in specific disciplines (chemistry and language learning). Four studies focused on the use of features inherent to mobile devices to support learning such as multimedia capabilities (audio, photo and video), mobile instant messaging, and access to social media. Only two case studies involved exploratory research to identify current spontaneous use of mobile devices for supporting learning and explore readiness for further mobile learning initiatives.

Table 1: Summary Comparison of Mobile Learning Cases

Country	Level of implementation	Focus of initiative	Project aims
East and North-East Asia			
Japan (Uosaki, Ogata, Mouri & Choyekh, in press)	Various learning environments within Japan (Community & university)	Mobile App: Use of Mobile Learning Log (SCROLL) for language learning (vocabulary)	• App developed by the authors. • The app enables learners to record daily learning experiences with locations, text, photos and videos using smartphones and share those experiences with other learners. • On-going project with new functions continuously added to the system. • The app aims at linking learning in formal and informal environments to enhance opportunities for students to engage in informal learning. • Chapter evaluates effectiveness of app for language (vocabulary learning) in Japanese universities
Republic of Korea (Pooley, in press)	Pilot project – student perspectives	Mobile Instant Messaging (MIM) for language learning & intercultural communication	• International students involved in student exchange programs to Korea experience challenges learning the Korean language. • MIM chat rooms were trailed as tools to ease social and cultural challenges between Korean and international speakers and enabled additional informal language development opportunities. • Students advised to use local MIM platform KakaoTalk which contains all the features of traditional SMS, including additional ways to incorporate textual and visual media, and does not require network data use.
South-East Asia			
Laos PDR Cambodia (Starasts, Xiong & Ly, in press)	Exploratory study of current use by lecturers and students at two universities: National University of Laos (NUOL) & Royal University of Agriculture (RUA), Cambodia	Mobile device features for supporting learning	• Few students have access to computers or mobile devices, mobile device ownership is more common. • Those who have access to mobile devices use them to communicate with lecturers through email or phone calls, social media and storage of learning content. • Access of learning content using mobile phones rather than computers is also common. • Lecturers and students lack access to sufficient technologies, resources and training for both e-learning and m-learning.

Indonesia (Padmo, Belawati, Idrus & Ardiasih, in press)	Institution wide implementation at Universitas Terbuka (UT), Indonesia	Mobile-interface website	• Implementation of mobile-interface website to enable students to access administrative study support, all courses and all learning content using mobile devices. • Development began in 2013 and has undergone a number of phases including preparation of infrastructure (applications and frameworks), content development (multimedia and OER), and program delivery (including tutors, technical assistance and support systems).
Malaysia (Gabarre, Gabarre & Din, in press)	Pilot project – student perspectives	Social media (Facebook) on mobile phones for foreign language learning	• Pilot study to provide alternative environment to the university's LMS which limits student's abilities to discuss freely and post multimedia content. • An open Facebook page was trailed as an alternative environment for running the full foreign language (French) course including uploading of student assessments.
Malaysia (Talib, Norishah, Shariman & Othman, in press)	Presentation of app & expert evaluation	Mobile app: application of Organic Chemistry Reaction Application (OCRA) for gamification of chemistry learning	• Practical demonstration of the functionalities of a mobile app to support learning of complex constructs in undergraduate chemistry modules. • Demonstration of an app designed to enhance the value of learning in the mobile education context and future work will involve the development of a generic pedagogical model underpinning the design of any mobile application for educational purposes
Malaysia (Darmi & Albion (in press)	Pilot project – student perspectives	Mobile device features (audio recording) for supporting language learning	• Pilot study to assess the potential for mobile devices to be used to support English language learning. • Students were encouraged to use the audio recording facilities of mobile devices to practice English-language learning tasks prior to assessments. • Findings were compared to a control group and demonstrated an increase in learner performance at the end of semester.
Malaysia (Ariffin, in press)	Pilot project – student perspectives	Mobile device features for student driven content generation for the study of local culture	• Students undertaking a local culture studies program used photos, audio and video to generate creative content for assessment. • The pilot resulted in development of new multimedia skills, encouraged collaborative and student-driven authentic learning, empowerment of students and improved learning outcomes.
Singapore (Tan & Soo, in press)	Pilot project – technical instructions on app creation	Mobile app: development of 2 apps to support chemistry learning	• Demonstration of app development process to support content expert educators with technical insights to create their own apps. • Frequency of app use appeared to be highly correlated with improved learning outcomes.

Oceania and Pacific Islands			
Samoa (Ozawa & Ualesi, in press)	Exploratory study of current use of mobile technologies for learning at the National University of Samoa	Mobile device features for supporting learning	• Pacific islands are highly distributed and connected through microwave connections, to be replaced by submarine optical fibre cables. • Current internet bandwidth poor resulting in difficulties delivering online learning. • Findings concluded that most students have internet access on their mobile devices, students are already using mobile technologies to access learning materials and are interested in using mobile devices for further learning purposes, but are unsure how.
Fiji (Sharma, Kumar, Rao & Finiasi, in press)	Institution-wide implementation at the University of the South Pacific (USP)	Mobile learning programme consisting of 4 integrated approaches; (a) short message service, (b) edutainment, (c) mobile course modules, (d) tablet-based learning	• USP is a multi-campus university consisting of 14 campuses in 12 member countries which due to geographic spread is challenging for delivery of traditional print or online learning. • The mobile learning program was developed (1) to access information and knowledge, (2) to establish a vibrant online community of Pacific learners, (3) to empower students to create and share knowledge, essentially transforming them from mobile learning users to mobile learning producers, and (4) to design or deploy mobile learning tools to provide and support learning.
Fiji (Kumar & Mohite, in press)	Institution-wide pilot project at Fiji National University	Evaluation of mobile app (MLearn) developed to provide students with access to lecture notes, tutorials and course information	• MLearn was developed to provide distance and flexible learning students with a mobile learning facility. • Evaluation was conducted in response to expressed student dissatisfaction. • Findings indicated usability problems and recommendations were developed to improve the app.

Learning, Teaching, Technical and Organisational Implications

While each of the case studies has a focus on one or two of the levels of the framework they all discussed implications across the four levels and there are many commonalities between the case studies across the countries of the Asia-Pacific region, regardless of the level of development. Several of the implications also apply across one or more levels; for example, the need for training and support applies across all levels as the development of digital literacy skills are important for both staff and students; development of new pedagogical approaches is important for staff, technical knowledge is needed by staff and students and institutions need to provide the necessary support and training. There were no clear differences between regions with regard to the types of concerns or developments that are occurring. The most notable of the learnings and implications are (summarised graphically in Figure 1):

Learning: The use of mobile technologies for language learning was one of the main themes with Darmi and Albion (in press) discussing how use of mobile phones can alleviate language anxiety levels amongst Malaysian undergraduates learning English and Pooley discussing how they can be an enabler of intercultural communication among speakers of two dissimilar languages. Adoption of mobile learning can encourage the amount of learning that occurs out of the formal classroom (Uosaki et al., in press), and those students who regularly use specially developed apps are more likely to achieve higher grades than those who only use these rarely (Tan & Soo). There some problems when generic apps are used as these are often authored in English which may not be the first language (or even spoken at all) by a large number of students and they will not contain appropriate cultural content. However, there are some institutions that have strict policies prohibiting use of mobile devices in class, which limits the uptake of this type of learning to outside class (Ozawa & Ualesi, in press). In this case study from Samoa, the use of mobile devices is still quite rare. Another advantage of mobile learning is the use for student-generated content, utilising the multi-media capabilities of mobile devices, which can lead to deeper understanding of content (Arrifin, in press).

Teaching: Several authors (Gabare et al, in press; Starasts et al., in press; Talib et al., in press) noted the need for teachers to consider a change of pedagogy to student-centred, collaborative, constructivist approaches. Support and training for these pedagogies as well as digital skills are also discussed as important areas of consideration (Ozawa et al., in press; Sharma et al., in press; Starasts et al., in press). Many educators across the globe, not just in the Asia-Pacific region favour didactic, instructor-led approaches to learning. To effectively embrace mobile learning, some instructor authority needs to be ceded as students take charge of their own learning (Brown & Mbati, 2015).

Technical: Development of apps was a major consideration for several of the institutions (Kumar & Mohite, Sharma et al., in press; Uosaki et al., in press) particularly in the Chemistry discipline (Talib et al., in press; Tan & Soo., in press) while usability, including the small screen size and limited input capability, and lack of Wi-Fi/network access are discussed in three case studies (Kumar & Mohite., in press; Ozawa et al., in press; Sharma et al., in press). Apps frequently have social functions that can allow sharing of content and discussion between users. Augmented reality apps can allow for exploration of historical sites with just-in-time information. Apps can also allow for creation of content, leveraging the features of the smartphone such as camera and sound recording features (Johnson et al., 2012). The literature indicates that discipline-specific mobile apps will become more popular. For example, there are large numbers of apps for foreign language students including dictionaries and flash cards. For almost every discipline, there are a number of apps available for both Android and iOS devices (Oz, 2013).

Organisational: The main issues of concern from an organisational perspective were the adoption of relevant policy and guidelines (Owaza et al., in press; Starasts et al., in press) and provision of relevant infrastructure, resources, support and training. (Padmo et al., in press; Sharma et al., in press). Interdisciplinary collaborations as well as between researchers were also considered important (Kumar & Mohite, in press; Tan & Soo, in press). UNESCO policy guidelines were written in order to expand and enrich educational opportunities for learners in diverse settings, particularly for those in countries with little in the way of policy guidance (UNESCO, 2013). Their aim was to provide guidance to institutions around the integration of mobile learning into education policy and were written to support and enable teaching and learning through the safe, affordable and sustainable use of mobile technologies (Parsons, 2014). Though these guidelines are available, there is little evidence of their widespread adoption across the Asia-Pacific region.

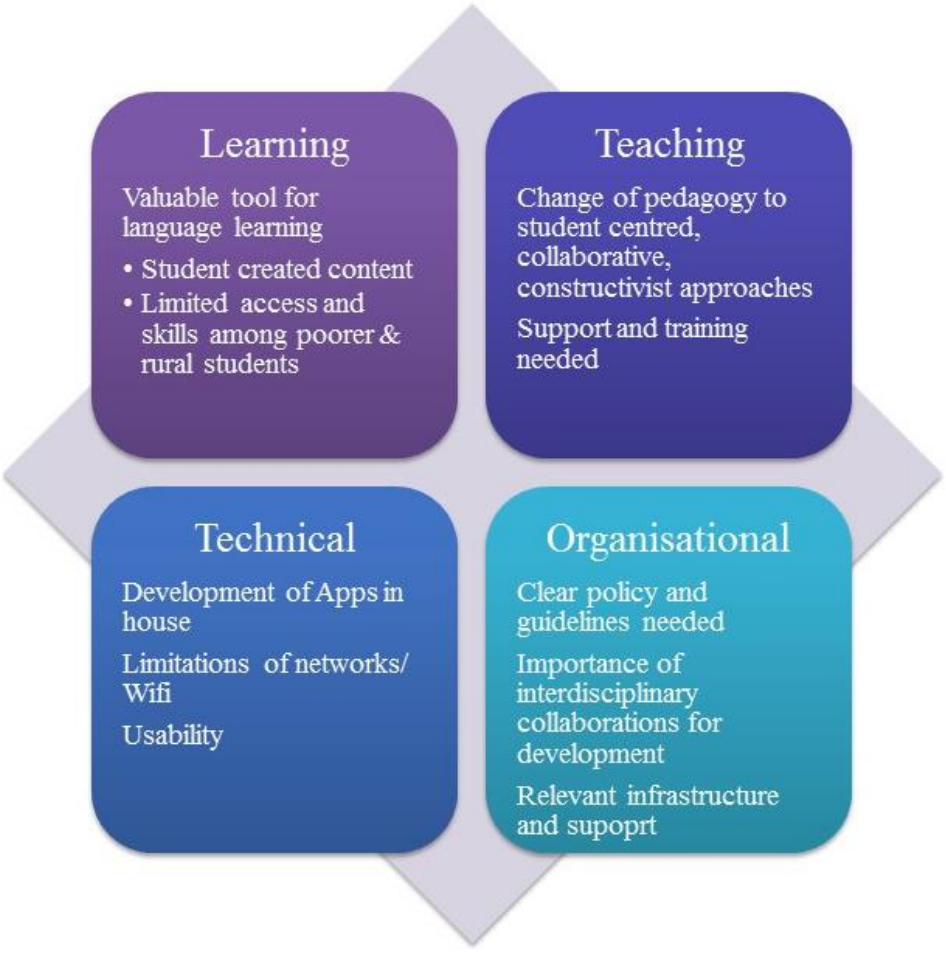

Figure 1. Implications of mobile learning adoption

Conclusion

On May 16 2011, the United Nations declared that access to the internet was a human right. That statement has implications for governments in terms of the provision of infrastructure, hardware, social access and so on (La Rue, 2011). Even so, broadband internet penetration remains poor in most of the Asia Pacific region. Due to the poor access to broadband internet, and in some cases, even electricity, there has been a marked lack of success with e-learning in many parts of the Asia Pacific. More recent data suggests that prices for mobile phones and internet access have dropped substantially, opening the door for mobile learning initiatives in these areas (So, 2012). Even though mobile devices and subscriptions may still provide a significant cost for many people, mobile technologies are more affordable than both broadband internet and desktop or laptop computers. In addition, mobile learning provides study options to learners who are geographically remote from physical campuses and allowing them to fit study around their work or carer commitments (Chun & Tsui, 2010). Even so, critical success factors for the incorporation of mobile learning in education include: a high market penetration of mobile phones; adequate technological infrastructure (wireless network and mobile applications): and specific professional development on mobile learning for teachers (So, 2012). Educators need to address the blending of formal and informal learning. The case studies highlighted in this paper are beginning to do just that.

Though a number of challenges have been identified in the case studies examined, it would be a mistake to assume that these are restricted to the countries of the Asia Pacific. Western culture dominates most regions of the world, pushing aside local cultural nuances, and privileging the English language over all others. Even within Australia where English is the official language, Aboriginal and Torres Strait Islander leaners are disadvantaged as English may be their second, third or even fourth language. Similarly, though many instructors in the Asia-Pacific region favour didactic, teacher-led pedagogies (Johnson, et al., 2012), this is common in many other regions and countries. These dominant pedagogies are not conducive to the adoption of mobile learning whereby learning is often student-centred and self-directed.

The widespread adoption of mobile learning in the Asia-Pacific, in common with mobile learning in other regions of the world, will depend on leveraging how students are already using their mobile devices in everyday life. Social networking is increasingly being used by educators to promote interactivity in classrooms and to enhance collaborative opportunities. Interestingly, people in the Asia-Pacific are some of the world's most frequent users of popular social networking sites such as Facebook and Twitter. In 2010, Indonesia, the Philippines, and Singapore were among the top ten Twitter users in the world. Similarly, the Philippines and Indonesia are among the top ten markets of unique Facebook users, ranking third and fourth respectively. With these numbers, it allows the features of social networking such as discussion boards, the ability to broadcast announcements to select groups, share photos and videos, and so on to be leveraged for mobile learning. Anecdotal evidence would suggest that groups of students frequently form Facebook groups to offer mutual support and discussion opportunities in specific courses and programs. The use of web 2.0 tools to collaborate is becoming increasingly popular in this region (Tsai & Hwang, 2013).

When designing mobile learning initiatives in an area as culturally diverse as the Asia-Pacific region, the rules and roles of the social relationships in the mobile learning space must be made explicit. Also, when designing mobile learning initiatives across cultural boundaries, special care must be taken to accommodate the cultural differences between designer and learner (Teal et al., 2014). Regional factors must be considered when designing for the learning behaviours of students. Each country has its own unique economic, political and cultural context which may impact on how students can learn (Tsai & Hwang, 2013). Instead of just using mobile devices for generic learning activities, as far as possible cultural learning and recognition must be incorporated into activities. For example, use mobile learning for cultural or social studies programs (Tsai & Hwang, 2013).

As significant as the barriers and challenges are, this paper highlights some of the successful initiatives undertaken by educators in the diverse contexts of the Asia-Pacific. As infrastructure to support these and other similar initiatives is built and the cost of technologies and access continues to decrease, there is likely to be a burgeoning of mobile learning initiatives and their widespread and sustained adoption across institutions.

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