Investigating lecturers' reasons for adoption of mobile learning in higher education: A case study

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The usage of Mobile Learning (M-learning) has grown among Institutes of Higher Learning worldwide as mobile technologies benefit teaching and learning. Despite this interest, there is a lack of M-learning research in formal educational contexts and the reasons for lecturers to adopt M-learning in a Singapore private education institute have been limited. Furthermore, the Teaching and Learning Division (TLD) of the institution which looks after the professional development of lecturers and sponsors innovative technology-mediated learning initiatives like M-learning is keen to find out how lecturers can be supported to encourage a greater usage of M-learning. After interviewing 10 lecturers, the research found that the following five reasons influence lecturers' adoption of M-learning from most important to the least: Usefulness in Teaching and Learning, Barriers to using M-Learning, Ease of use of mobile technology, Students' Motivation and Service quality of the M-learning systems. From this, TLD can identify and develop strategies to support the successful integration of M-learning. The five support aspects considered when implementing M-learning are found to be the following in descending order of importance: Professional Development, Social, Organisational, Technical and Advanced features to support teaching and learning. This research has clarified the existing literature in M-learning especially in formal learning contexts where learning is intentional and recognises the role that lecturers play in the future adoption of M-learning.

Keywords: M-learning, mobile technology, lecturers, technology-mediated, information and communication

Introduction

M-learning is defined as an educational environment where students can do their learning activities using any internet-enabled mobile devices over a wireless network anywhere, anytime in both formal and informal learning contexts (Pramana, 2018). In other words, learners have the freedom of the time and place for learning, with the aid of mobile devices and the internet, and learning can occur in the institute where learning is intentional with a purpose in mind or outside of the institute where learning is incidental and not consciously pursued as an end goal in mind. In the last decade, research into M-learning has been focused on the use of mobile technology to achieve anytime, anywhere, ubiquitous learning (Hung & Zhang, 2012) valuing predominantly its location awareness, motion detection and augmented reality (Baran, 2014), particularly in informal learning where learners learn spontaneously because of an immediate desire to know how to do or understand something. However, among the issues that were largely lacking in M-learning research are the use of M-learning in formal learning contexts and the reasons for M-learning integration from the teaching faculty's standpoint as pointed out by Pedro, Barbosa and Santos (2018).

Firstly, the use of mobile devices in formal learning environments have often been reframed as technology enhanced learning instead of M-learning although mobile devices are used to encourage active learning in the classrooms due to their positive characteristics of convenience and immediacy (Alamäki & Ab, 2003). For example, students can participate in a game quiz for lecturers to check for their understanding and lecturers can give immediate feedback to clarify common misconceptions. Regarding the educational contexts of M-learning studies, Chee et al. (2017) reported that when these contexts are revealed, informal learning contexts are predominant. This is ironic because academic institutions exist to promote formal learning in which learning is both intentional and the goal of all the activities that students engage in within the campus. Hence, M-learning should encompass the use of mobile devices for all learning activities that take place on campus in lectures and tutorials.

Secondly, although many lecturers are seeking to identify suitable technological devices and applications to engage their classes and promote active learning practices in their students, there are not so many studies that try to understand the integration and the actual results of M-learning practices from the faculty's perspective. Research in the past have tended to focus on students' opinions (Uzunboylu, & Ozdamli, 2011). Lecturers' adoption of M-learning is becoming increasingly important due to the fundamental role they play in the process

of mobile technology integration. Although academic staff with higher academic ranks can influence lecturers to use M-learning (Hao, Dennen & Mei, 2017), lecturers' adoption of M-learning increases when they are given the autonomy to adopt M-learning instead of being mandated to do so (Akman & Kocoglu, 2016). M-learning is also gaining traction in higher education institutions due to its prevalent use among students who are millennials. Globally, more of such institutions are adopting M-learning due to their immense benefits such as allowing students to interact with their lecturers and peers, find answers, facilitate collaboration, share knowledge (Al-Emran, Elsherif & Shaalan, 2016). With the advent of educational mobile apps like 'Socrative' and 'Kahoot!', students can now interact with their lecturers and be more active in their own learning (Jackman, 2014). Hence, if lecturers can leverage M-learning in their teaching and learning, they will be able to engage their students more effectively and this will result in better overall learning outcomes. This also resonates with the conference theme on personalised learning. Lecturers want to be intentional in the design of their curriculum so that they can cater to the diverse learning styles of every student.

The Teaching and Learning Division (TLD) of the institution in this case study typically sponsors projects that deliver learning content via mobile platforms. These M-learning initiatives are introduced to improve students' higher education experience, prepare them for the future digital workplace and enable student-centred learning. The division also provides pedagogical guidance and technical support to lecturers in the delivery of M-learning. M-learning in the institution is at its infancy stages. Before carrying out this case study, there was an accurate ground sensing based on lesson observations by the division that the adoption of M-learning among lecturers within the institution is below the Management's expectations due to the following reasons: distraction by students, inertia by lecturers to teach with mobile technologies due to low tech-savviness. Lecturers resist adopting M-learning as they are afraid that their students will be distracted by their mobile devices during lessons which can be detrimental for learning. Multitasking with mobile devices is prevalent among students in classes nowadays (Chen & Yan, 2016). Moreover, most students feel guiltless when multitasking in class with their mobile devices for purposes unrelated to their lessons (Mueller et.al., 2012). As most of the lecturers in the institution are on part-time contracts, it is difficult for the Management to mandate lecturers to use

M-learning and assess whether they meet organisational targets of integrating mobile technologies in their lessons. Hence, many lecturers experience inertia; they seek to retain their existing teaching styles and maintain the status quo. Lecturers with a high level of inertia feel stressed about integrating a new technology as an instructional tool; they refrain from investing time to adjust to the change (Hamidi & Chavoshi,2017). Attitudes, including anxiety, impede the recognition of M-learning as an effective learning process (Celik & Yesilyurt, 2013). Although the potential of M-learning is now recognised, lecturers' lack of self-efficacy to exploit M-learning remains a barrier. Boosting lecturers' abilities to integrate mobile technologies in their lessons is essential. Technology alone does not enhance pedagogy; lecturers must be trained to evaluate the pedagogical affordances of M-learning tools to use them effectively. Cochrane's framework is used to guide this study as it supports creative pedagogies via Bring Your Own Devices (BYOD) (Cochrane, 2014). It models a community of practice (COP) focusing on redefining pedagogy and provides an appropriate technology support infrastructure. M-learning enables the nurturing of learning communities across varied contexts that would have been impossible previously. Focusing on student-centred learning via mobile platforms allows for student creativity and collaboration. By examining the reasons for M-learning adoption, TLD can then make informed decisions before investing limited funds into these projects. This study will bridge the two gaps by scrutinising the reasons influencing M-learning usage in formal learning contexts and find out lecturers' motivation to use
M-learning by obtaining detailed responses from them. The findings from this research will also expand the limited findings on the support needed by lecturers to adopt M-learning particularly in the Singapore context.

This case study seeks to answer the following research questions:

RQ1: What reasons do lecturers perceive to influence their adoption of M-learning for their teaching?
RQ2: What support do lecturers expect in the design, implementation and evaluation of their teaching?

Method

10 adjunct lecturers participated in face-to-face interviews organised within the campus. There was equal representation from both genders, five males and five females with a range of teaching experiences from 1 to 19 years. 60% of the lecturers have implemented some form of M-learning whereas 40% have not. The interview instrument was derived from previous literature and developed with a set of 'a priori' questions to collect qualitative data to answer the research questions. The objective of the interview questions was to collect in-depth responses and solicit both positive and negative responses to M-learning. A total of eighteen open-ended questions were posed in each interview. These questions relate to (a) reasons influencing M-learning Adoption, (b) support

needed to deliver M-learning effectively. An interview template was used to ensure that the participants were not predisposed to believe that the research was intended to reflect positively or negatively on M-learning. During the interview, participants were informed of the broad definition of M-learning which considers both formal and informal learning contexts. Consent was sought from the lecturers before their participation in the interviews. A consent form was signed by each lecturer before proceeding with the interview. Interview notes were taken and then used for data analysis. Interview transcripts were read repeatedly and interpreted using thematic analysis in a deductive way. Based on the 'a priori' framework, a set of codes organised into categories identified in previous literature have been developed based on the main reasons influencing M-learning adoption among lecturers namely Usefulness in Teaching and Learning, Ease of use of the technology, Service quality of the M-learning systems and the key support aspects required to assist lecturers in M-learning implementation specifically organisational, technical, social support and professional development. The framework summarises the data to focus on answering the two research questions.

During coding, lecturers' identities were replaced with an abbreviation system to preserve their confidentiality. A coding sample was completed at the beginning of one interview transcript and checked by the researcher's supervisor before the rest of the interviews were coded in the same manner. First, the interview text was searched for repeating ideas. Expressions of an idea or ideas relevant to both research questions were scoured and then coded as sub-themes. Responses from the interviews were then organised into a series of sub-themes which capture the meaning of the lecturers' responses in short phrases. The frequency of all the sub themes was then recorded. Sub-themes with similar ideas or meanings were subsequently grouped together into primary themes based on their common characteristics. Primary themes were then collapsed together to fall under the broader categories identified in the 'a priori' framework until no more common primary themes were identified for each category indicating that saturation point has been reached. It was found that most of the theme categories mirrored the reasons and support aspects identified in the literature review. Coding consistency was constantly checked via a reexamination of the initial assigned sub-themes during the coding process. When additional sub-themes were identified illustrating an unconsidered reason or support aspect not found in previous literature, existing categories from the 'a priori' framework was examined to include the newly emerged categories. These new categories were further confirmed by the lecturers to ensure consistency.

Findings

The analysis of the data generated from the interviews revealed five main thematic categories pertaining to the first research question as shown in Table 1 in ranking order from most important to least: Usefulness in Teaching and Learning, Barriers to using M-learning, Ease of use of mobile technology, Students' Motivation and Service quality of the M-learning systems and five thematic categories related to the second research question in ranking order from most important to least as shown in Table 2: Professional Development, Social, Organisational, Technical and Advanced features to support teaching and learning.

Table 1
Reasons influencing M-learning adoption

Rank	1	2	3	4	5
Categories	Usefulness in Teaching and Learning	Barriers to using M-learning	Ease of use of mobile technology	Students' Motivation	Service quality of the M-learning systems
Reasons	Usefulness in Students' Learning	Distractedness	Perceived Ease of use	Students' self-directedness	Technical
		Limitations			
	Usefulness in Teaching	Time constraints	Easy to learn	Students' interest	

The results from this study suggested that M-learning's usefulness in Teaching and Learning is the main reason considered by lecturers when deciding to adopt M-learning. Lecturers must believe that M-learning can help their students learn better and enhance their delivery. This is followed by a new category that emerged which is the barriers to using M-learning. A prevalent theme that emerged among all lecturers was the problem of students' distraction with their mobile devices. Aligned with literature, the ease of use of mobile technology is the next necessary consideration. Lecturers are inclined to adopt M-learning when they have the necessary skills to implement it and mobile technologies are easy to use and navigate. Another new category that appeared was 'Students' Motivation'. Many lecturers felt that even though mobile platforms host a large repository of learning materials, these learning materials are redundant if students do not have the self-directedness to access them for learning. The last theme that emerged is the service quality of M-learning systems as a reliable IT infrastructure,

robust access control mechanism to authenticate and authorise users, and elimination of technical issues are highly desired by lecturers.

Table 2
Support required for successful M-learning implementation

Rank	1	2	3	4	5
Categories	Professional Development	Social	Organisational	Technical	Advanced features to support T&L
Support	Type of Training	Intrinsic motivation	Workload	Quality of IT	Device attributes
	Training Delivery style	Extrinsic motivation	Policy	Operational Efficiency	Affordances of M-learning
	Disciplinary Learning		Interdepartmental support		

The main support category that emerged is the professional development of lecturers to enhance their instructional and technical knowledge. Next, social support in terms of peer pressure from their colleagues and interdepartmental support from key entities will ensure smooth M-learning implementations. This is followed by organisational reason in terms of workload related issues and institution's policy regarding the use of M-learning as a teaching and learning strategy. Subsequently, technical issues were highlighted to be as critical in the implementation of M-learning initiatives. The need for quality IT network in campus and operational efficiency to minimise technical problems are important. A new category 'Advanced features to support teaching and learning' emerged after coding. It comprises a list of device attributes and affordances that lecturers perceive to be helpful but only possible when mobile technology advances. This includes the control over students' use of their mobile devices in learning activities.

Discussion

This study contributes to the existing literature in several respects. Results from the first research question show that perceptions on any technology-mediated educational innovation will influence its practical integration and that M-learning system will not be utilised if it is deemed useless by lecturers (Huang, 2014). The results for the first research question showed that usefulness is the strongest reason for lecturers to adopt mobile learning. Usefulness in terms of enhancing students' learning took precedence over usefulness in terms of enhancing lecturers' lesson delivery. Mobile learning can transform pedagogy to cater to millennials because it offers the opportunity for active learning strategies like helping students distill complex topics into single words through the creation of a live word cloud, resulting in higher-level learning (Stoerger, 2013). With mobile technology, a group of learners can access content from electronic repositories, validate the content and help one another regardless of location. M-learning benefits learners because they can use mobile devices to learn in their own learning community where situated learning, authentic learning, context-aware learning, augmented reality mobile learning and personalised learning are encouraged (Quinn, 2013). Mobile technology allows learners from different cultures to express themselves more readily compared to face-to-face situations (Wang et. al., 2009). Half of the lecturers concurred with research by Wang et. al.'s (2019) research as they can obtain responses from all learners especially introverted students via M-learning. The usefulness in teaching is the second most valued subtheme as the use of mobile technology allows for cloud teaching where access to students to give immediate feedback and gather responses can occur regardless of location, aligning to Sutch's (2010) research. Furthermore, in line with previous research, the ease of use of mobile technology emerged as the third most important theme. User-friendly M-learning systems that are easy to follow as well as mobile applications that are easy to navigate will encourage usage. Otherwise, mobile technologies that are easy to learn must have clear instructions so that minimal efforts are required to pick up the skills to use them. Ishtaiwa et. al. (2015) noted that learning to use mobile technologies requires a wide range of complicated applications and activities so a certain level of tech-savviness is needed. The last theme that emerged is the Service quality of the M-learning systems which covers the availability of a reliable IT infrastructure, robust security system and low incidents of technical problems. This is to ensure that the quality of the videos on mobile platforms is good so that learners can learn at their own pace by speeding up or slowing down the playback of these videos.

Two new categories that emerged were the barriers to using M-learning and Students' Motivation. Barriers to using M-learning emerged in second place as lecturers were concerned that students would end up "doing other things since it is difficult to monitor what students are doing when they are using their mobile phones." This resonates with research by Ishtaiwa et. al. (2015) which included distractions like chatting, playing, posting and

browsing on students' mobile devices. The next barrier is the limitations of M-learning system due to the lack of appropriate affordances for teaching as one lecturer remarked, "I must work around these limitations to deliver M-learning the way I want it." Finally, time constraint was highlighted as there is a trade-off between the time lecturers use to prepare M-learning resources and their personal time, thereby affecting their work-life balance. Another new category that surfaced in fourth place is Students' Motivation which is essential for M-learning to succeed. Students must be self-directed to complete the homework in informal learning with adequate positive reinforcements to ensure they learn out of the classroom. Despite the wide range of activities enabled by M-learning, lecturers pointed out that they "cannot use the same M-learning system or tool in every lecture as its novelty effect among students will wear out".

Results from the second research question reveal that lecturers need support at integrating M-learning into their practices. The support includes adequate training that is both 'hands-on' and 'practical'. A one-size-fits-all model of training would not adequately equip the lecturers with the needed skills as mentioned in Ishtaiwa et. al. (2015). In terms of disciplinary learning, lecturers wanted to be 'grouped according to their subject domains' with M-learning case studies to be 'subject specific'.

Social support come next as positive experiences and benefits of M-learning utility encourages lecturers intrinsically to implement M-learning. Most lecturers inherently want to share their M-learning experiences constructively if the benefits of M-learning to their students' learning are significant, no issues were encountered during M-learning deployment, and M-learning lends itself well to their content or subject. This is followed by extrinsic motivations such as having their M-learning work recognised for showcase to others. In third place is organisational support which saw workload-related issues taking the lead, followed by the institute's policy and interdepartmental support in this order. Most lecturers felt that making M-learning more prevalent in the institution will make their workload more demanding at first due to the 'initial switchover effort'. However, the workload may become less over time. The importance of having a systematic M-learning institutional plan across all programs is seen to be critical. Lecturers want to know clearly the institution's position on the use of M-learning as a teaching and learning strategy as well as the support from the various departments that work with them to ensure smooth M-learning implementation. Technical support appeared in fourth place as lecturers encountered Wi-Fi connectivity in some rooms within the campus. Students reported that their devices were not well-connected, thus preventing them from participating. It is obvious that technology integration does not produce ideal results if it is hindered by lack of infrastructure as shown by Alrasheedi et. al. (2015). 'Advanced features to support teaching and learning' emerged as a new, final category. Lecturers hoped for 'individualised content' to achieve learner-centric outcomes and 'personalised content' to cater to various learning styles of students. Since mobile technologies serve short nuggets of information, it may not promote deep thinking or critical thinking required from students in higher education.

Conclusion

This case study helps to identify the reasons on lecturers' adoption of M-learning and the support to encourage M-learning. This case study found that Usefulness in Teaching and Learning, Barriers to using M-learning, Ease of use of mobile technology, Students' Motivation and Service quality of the M-learning systems are reasons for lecturers' behavioral intention to implement M-learning. The negative roles of barriers to using M-learning and lack of students' motivation were newly highlighted in this study. Students' distraction and indifference to learn via M-learning deter lecturers from using M-learning. Professional Development, Social, Organisational, Technical and Advanced features to support teaching and learning are needed to successfully implement M-learning in the classroom. By focusing on students' needs in the use of learning technologies and through sound pedagogical practices, lecturers can be more intentional in their learning design of M-learning. The main limitation in this study is the use of self-reported interviews as a data collection method. The study was built on lecturers' perceptions of M-learning integration and may not reflect actual practices. Observational data on the actual integration of M-learning and students' perceptions about M-learning could be gathered to triangulate and reinforce the results found in this study.

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