

EDUCATORS ADOPTING M-LEARNING: IS IT SUSTAINABLE IN HIGHER EDUCATION?

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ABSTRACT

Effectively integrating m-learning into higher education necessitates consideration for both student and educator adoption factors. Data collected from 309 Canadian university participants in a Mobile Information Literacy (MIL) research study identified specific student m-learning adoption factors and substantiated those in the literature (Navarro et al., 2016; Wang et al., 2009). Recent m-learning studies (Abu-Al-Aisb, & Love, 2013; Ally & Blásque, 2014) indicated that institutional and educator support is needed to support student m-learning adoption. Our research findings supported this and inspired the researchers to establish a new study to investigate educator attitudes toward integrating m-learning in their teaching and to understand how institutions can support such individuals. Study results intend to support educators focused on pedagogical transformation, to successfully integrate sustainable m-learning in their physical and virtual classrooms.

KEYWORDS

Pedagogy, mobile learning, educator role, institution support, adoption, sustainability

1. INTRODUCTION

Research literature examining m-learning in post-secondary education predicts it will play an important role in the future of student learning and suggests that “education on the go”, utilizing mobile devices such as mobile phones and tablets, expands the boundaries of anytime, anywhere learning (Saunders, 2012; Wu et al., 2012). M-learning, defined as the use of mobile devices to deliver electronic learning materials with built in learning strategies to allow anywhere and anytime access to knowledge, has been introduced and incorporated into the pedagogical repertoire of many educators globally from a variety of academic disciplines (Cheon, 2012; Keengwe, 2014; Schmidt Hanbidge et.al, 2015). Hence, a rich body of literature has emerged that utilizes various adoption models of technology to examine and identify students’ adoption factors of m-learning (Koole, 2009; Navarro et al., 2016). A study conducted by Schmidt Hanbidge et al. (under review) tested an Information Literacy course (<http://bit.ly/milmodules>) with Canadian university students that substantiate the student adoption factors outlined in the literature. Key student adoption factors included personal innovativeness of students, ICT literacy, self-management of learning, previous computer experience, ICT anxiety, and confirmation and satisfaction.

Based on recent literature focused on student adoption factors and integration of m-learning into higher education (Cheon, 2013; Keengwe, 2014; Navarro, 2016) and findings from our MIL research study, is a call to examine the role that educators play in m-learning adoption. This call motivated the authors of this paper to appraise the current literature focusing on the role of educators in m-learning adoption and reflect upon the following questions:

- How are educators currently implementing m-learning into higher education?
- What are the challenges of m-learning implementation for university educators?
- What pedagogical and technical institutional supports are available for educators implementing m-learning?
- What is the sustainability of m-learning in higher education?

A notable lack of research focuses on pedagogical transformation and sustainable integration of m-learning into formal education contexts supporting educators and researchers collaborative efforts. Our paper will contribute to this gap in the literature with a description of findings from our information literacy learning innovation and will indicate new directions for developing and enhancing sustainable mobile technology efforts in higher education.

2. BODY OF PAPER

2.1 How can m-learning be integrated into higher education?

Al-Emran et al. (2016) assert that Arab Gulf countries take on leadership roles in m-learning research in higher education and surveyed attitudes of fifty-four educators from five Arab Gulf universities towards m-learning in higher education to determine their intentions of using m-learning in educational contexts. Findings indicate that most educators had positive attitudes towards m-learning notwithstanding differences in age, gender, academic rank, academic experience and smartphone ownership. Conclusions suggested that m-learning can be adopted by a variety of educators in higher education. For those advocating for the inclusion of m-learning in Canadian higher education, these findings are reassuring as they suggest the possibility of a positive adoption of this pedagogical approach to teaching and learning. Similar research must be conducted in the Canadian context to see if educators share such similar positive attitudes towards m-learning.

Lindsay (2016) examined the integration of m-learning by New Zealand educators and contends it is important for educators to consider how they incorporate m-learning into their pedagogy to ensure that m-learning teaching is student-centred, authentic, higher order, and collaborative. Lindsay outlined five characteristics of design approach to m-learning: *associative* (tool substitution to augment existing activities), *individual constructive*, *collaborative* (e.g. augmented reality/game-based learning), *situative* (authentic activities in “real” settings), and *informal* (outside formal education). She contends the pedagogical approaches predominately used by educators were substitutions and augmentations, meaning utilizing technology as a direct tool substitution rather than a transformative approach to teaching and learning. We believe it is important to understand how educators in university institutions incorporate m-learning into their teaching, what design approaches, and what institutional supports are most successful in higher education.

2.2 What are the challenges of m-learning implementation in higher education?

“Ease of use” of mobile devices based on the size of screens and limited information displayed were identified as posing technological challenges for m-learning (Schmidt Hanbidge et. al, 2015). A review of 168 journal articles published between 2006-2014 examined mobile usability showed that only about fifty percent of the m-learning applications performed usability tests (Navarro et al., 2016). These authors recommend that implementation of a pedagogical usability evaluation framework for m-learning. Other studies identified the importance of student adoption of m-learning (Navarro et al., 2016; Wang et al., 2009) while Roblyer et al. (2010) report on differences between students and educators use of technology.

Shadle et al. (2013) from BOISE University, set out a variety of supports for educators who wish to include m-learning in their courses. The importance of “Centers for Teaching & Learning” are highlighted in bringing together interdisciplinary faculty groups to discuss their experiences with m-learning and their roles in encouraging educators to conduct action research of their teaching. They stressed the importance of providing the required hardware and software needed to access affordable data plans and WIFI. Weeklong m-learning institutes and mobile days support the need for technological support for both students and instructors. Schmidt Hanbidge et al (2015) and Shadle (2013) discuss the benefits of librarians and post-secondary educators working together to establish student digital literacy fluency.

While extensive m-learning research has been completed, there has been limited research about educators and m-learning in higher education settings. Institutional support needs to include m-learning in their academic center programs (Teo, 2009). Research conducted on teacher knowledge about using technology as a tool for

learning has not yet been adequately explored (Tai & Ting, 2011). We will explore methods to scale up information literacy innovations with educator buy-in to sustain m-learning. We suggest that the role of educators and their openness to explore technology may determine factors about the sustainability of mobile learning in higher education. Huang et al. (2005) contends that the successful integration of technology-facilitated learning depended on teacher attitudes and acceptance.

Our university, located in southern Ontario, Canada has over 3,000 full time faculty and sessional educators and over 33,000 students in various disciplines, heavily focused on mathematics, engineering, health-related fields and arts and humanities. Within our institution, there are supports available to educators, through the *Centre for Teaching with Excellence*, to enhance teaching practices with the learning management system (LMS) and in traditional classroom spaces. However, there is a notable gap in technical and instructional support for teaching with mobile technology that this study aims to address.

2.3 Information literacy integration

In higher education, an apparent gap exists between the information literacy skills that educators expect students to have and those that students actually possess. We advocate that students learn and enhance these skills early in university through an information literacy micro course we developed (<http://bit.ly/milmodules>) to access m-learning technology. Informally, students accessed information literacy lessons at their leisure and learning was reinforced through practice quizzes. Helping student learners improve their information skills using mobile device was a key outcome of this research study along with developing meaningful and significant contributions to the emerging knowledge in the field of mLearning.

Over the past two years, 300 students participated in a mobile information literacy course. In the mixed methods (quantitative and qualitative) project, participants completed thirteen online information literacy lessons and quizzes, pre- and post-tests and a questionnaire. Preliminary results indicate that 72% of students maintained or increased their information literacy skills. Top literacy lessons that students found applicable to their learning are identified (Table 1. Lesson use).

Which literacy lessons did you find most helpful?		
Answer Options	Response Percent	Response Count
Locate: Lesson 1: An Introduction to Primo Central	17.8%	47
Locate: Lesson 2: The Basics: How to Search	42.2%	111 (2)
Locate: Lesson 3: Finding Articles	39.1%	103 (3)
Locate: Lesson 4: Finding Peer Reviewed Journals	32.7%	86
Evaluate: Lesson 5: Evaluating Information Sources	22.8%	60
Evaluate: Lesson 6: Peer Review Process	17.9%	47
Evaluate: Lesson 7: Popular Vs. Scholarly Resources	25.8%	68
Use: Lesson 8: Using the Web for Resources	16.0%	42
Use: Lesson 9: RefWorks	42.5%	112 (1)
Use: Lesson 10: When to Cite Your Articles	30.0%	71
Use: Lesson 11: Types of Written Articles	15.2%	40
Use: Lesson 12: How to Approach Assignments	30.0%	79
Use: Lesson 13: What is a Paragraph?	9.5%	25
ALL OF THE ABOVE	5.7%	15
	answered question	263
	skipped question	14

Table 1. Lesson use

Our study confirmed when access to necessary tools is provided, students will use m-learning. Educational institutions should be aware of the student user implications and the consideration of the role of faculty members in such initiatives. As our study focused on student introduction to mobile learning for the specific purpose of developing information literacy knowledge and skills, our data positions us to identify trends in higher education that necessitate further exploration. Understanding student m-learning adoption preferences (Schmidt Hanbidge, Sanderson & Tin; Under Review) helped to frame this next stage of the project. Effective use of technology in the curriculum requires integration of learner characteristics, use of the technology to deliver a sound experience, sound pedagogical curriculum content, and educator and institutional support that integrate these aspects.

Educators play an important role in integrating technology into the learning environment. From our discussions with educators, it became clear that most did not have the experience nor the comfort level to

independently integrate mobile learning into teaching. We need better understanding about relevant factors that affect their adoption practices in their classrooms. Educators expressed interest in learning, but were not sure of the next steps to take to adopt m-learning. Institutional m-learning technical support and professional development for faculty members is necessary (Gülbahar et al., 2013; Schaffhauser, 2016). Although our university is innovative in many ways, the researchers believe that important institutional support for educators to adopt m-learning may be lacking.

2.4 Next stage: Educator m-learning project methodology

Our study will explore educator adoption of mobile technology into higher education with a focus on educator perceptions about their classroom experiences. This study will incorporate a mixed method approach, collecting both quantitative and qualitative information. A three-phase research design will be implemented following institutional research ethics approval.

Phase 1:

An in-depth literature review will be conducted to examine and critique resources that currently exist to enhance teaching with mobile technology on campus or virtual spaces.

Phase 2:

Educators across our university will be surveyed to determine whether they feel prepared to utilize m-learning in their on campus and virtual classrooms. Semi-structured individual interviews will be conducted to provide input on developing resources to encourage educator adoption, to provide support and tools (both technical and training) to aid in enhancing integration of mobile learning in higher education. All 3,000 teaching educators at the university will be invited to complete online questionnaires that include demographics data, and attitudes about integrating m-learning into student learning experiences with mobile devices. Construction of the new survey tools will incorporate attitude and adoption factor findings from the literature and from questionnaires developed from other technology-related studies (Lui, 2007; Teo, 2009). Additionally, semi-structured interviews with 10 educators that participated in the original MIL study will determine whether they plan to continue using the information literacy lessons and content in their individual courses. A follow up question will explore whether these educators intend to design and implement their own forms of m-learning activities. Interviews with faculty from the Center for Teaching Excellence will add further institutional information. All interviews will be recorded, transcribed and analyzed for key themes and trends.

Phase 3:

Data analysis identifying themes and trends will occur; subsequently project findings and recommendations will be disseminated.

Based on our earlier project, we intend to explore how to scale up and sustain our information literacy mobile innovation. The research study will consider how the Canadian higher education system context and its educators might adopt this learning innovation.

3. CONCLUSION

Contextual research must be conducted to explore whether Canadian educator experiences differ significantly from their global peers in sharing positive attitudes towards m-learning. Building on our previous research, our new study purports to focus on the pedagogical transformation and sustainable integration of m-learning into higher education contexts with an aim to support educators and researchers collaborative efforts. We will explore how to 'scale up' and sustain our information literacy mobile innovation.

REFERENCES

Al-Emran, M., Elsherif, H.M., & Shaalam. K. (2016). Investigating attitudes towards the use of mobile learning in higher education. *Computers in Human Behavior*, 56, 93-102.

- Cheon, J., Sango, L., Crooks, S., & Song, J. (2012). An investigation of mobile learning readiness in higher education based on the theory of planned behaviour. *Computers & Education*, 59, 1054-1064.
- Gülbahar, Y., Ilkhan, M., Kilis, S., & Arslan, O. (2013, February/March). Informatics education in Turkey: National ICT curriculum and teacher training at elementary level. In Diethelm et al (Eds.), *Informatics in schools*. Paper presented at the 6th International Conference ISSEP (77-87). Oldenburg, Germany.
- Huang, H.M. (2002). Towards constructivism for adult learners in online learning environments. *British Journal of Educational Technology*, 33,1, 27-37.
- Keengwe, J., & Bhargava, M. (2014). Mobile learning and integration of mobile technologies in education. *Education and Information Technologies*, 19, 737-746.
- Koole, M.L. (2009). A Model for Framing Mobile Learning. In M. Ally (Ed.), *Empowering Learners and Educators with Mobile Learning* (pp. 25-47). Athabasca, AB: Athabasca University Press.
- Lindsay, L. (2016). Transformation of teacher practice using mobile technology with one-to-one classes: M-learning pedagogical approaches. *British Journal of Educational Technology*, 47(5), 883-892.
- Liu, Y., Li, H., & Carlsson, C. (2010). Factors driving the adoption of m-learning: An empirical study. *Computers & Education*, 55(3), 1211-1219.
- Navarro, C.X., Molina, A.I., & Redondo, M.A. (2016). Framework to evaluate m-learning systems: A technological and pedagogical approach. *IEEE Revista Iberoamericana de Tecnologías del Aprendizaje*, 11(1), 33-40.
- Robyler, M.D., McDaniel, M., Webb, M., Herman, J. & Witty, J.V. (2010). Findings on Facebook in higher education: A comparison of college faculty and students uses and perceptions of social networking sites. *Internet and Higher Education*, 13(3), 134-140.
- Shadle, S., Perkins, R., Lincoln, D., Humphrey, M. & Landrum, E. (April 2013). Leading a Multiple Project Mobile Learning Initiative. (Research Bulletin). Louisville, CO: EDUCAUSE Centre for Applied Research. Retrieved from <http://www.educause.edu/ecar>.
- Schaffhauser, D. (2016). *Report: Evidence of tech use for learning in classrooms scanty*. Tempe, AZ: AdvancedED.
- Saunders, L. (2012). Faculty perspectives on information literacy as a student learning outcome. *The Journal of Academic Librarianship*, 38(4), 226-236.
- Schmidt Hanbidge, A., Sanderson, N., & Tin, T. (2015). Using mobile technology to enhance undergraduate student digital information literacy skills: A Canadian case study. *IAFOR Journal of Education*, 3(2), 108-121. <http://iafor.org/archives/journals/education/iafor-education-journal-special-edition-2015.pdf>
- Schmidt Hanbidge, A., Sanderson, N., & Tin, T. (Currently Under Review). Student learner characteristics and adoption of m-learning: Are we effectively supporting students?
- Tai, Y., & Ting, Y.L. (2011). Adoption of mobile technology for language learning: Teacher attitudes and challenges. *The JALT CALL Journal*, 7(1), 3-18.
- Teo, T. (2009). Modelling technology acceptance in education: A study of pre-service teachers. *Computers & Education*, 52(2), 302-312. <http://dx.doi.org/10.1016/j.compedu.200.08.006>
- Wang, Y., Wu, M. & Wang, H. (2009). Investigating the determinants of age and gender differences in the acceptance of mobile learning. *British Journal of Educational Technology*, 40(1), 92-118.
- Wu, W.H., Wu, Y.C.J., Chen, C.Y., Kao, H.Y., Lin, S.H., & Huang, S.H. (2012). Review of trends from mobile learning studies: A meta-analysis. *Computers and Education*, 59(2), 817-827.