

Switching Gears: Moving from e-Learning to m-Learning

Robert Crow

Western Carolina University
Coulter Faculty Center
Cullowhee NC, 28723 USA
rcrow@wcu.edu

Ieda M. Santos

Emirates College for Advanced Education
Abu Dhabi, UAE

John LeBaron

Western Carolina University
Dept. of Educational Leadership and
Foundations
Cullowhee NC, USA 28723

Anna T. McFadden

Western Carolina University
Coulter Faculty Center
Cullowhee NC, 28723 USA

Christine F. Osborne

Western Carolina University
Dept. of History
Cullowhee NC, 28723, USA

Abstract

This paper examines institutional practice regarding integration of mobile technologies into electronic teaching that has previously depended on computers alone. More specifically, this study explores challenges, opportunities and constraints reflected in efforts to transition from reliance on formal learning management systems for course development and delivery toward the infusion of media targeted to students' mobile devices. Based on three e-course case histories, this paper illustrates how the participants' university is addressing the transformational challenges found in the study and examines instructor perceptions about University support. The researchers conducted two in-depth semi-structured interviews which took place at different times to reflect the longitudinal experiences of the three participants over time. Main findings of the research suggest that institutional faculty need technical support, training and professional development to understand not only how to work with mobile devices but also the means to achieve clear instructional purposes with them.

Keywords: online teaching, mobile, higher education, leadership, support, training, innovation

Introduction

The 21st century is witnessing an increase in the use of mobile devices in different areas of society to meet the needs of individuals on the move. Interest in mobile learning is growing in higher education as signified by the number of conferences (e.g. mLearn, IMCL), projects, scholarly journals, technical reports, and books (Traxler, 2008; Herrington & Herrington, 2008; Kukulska-Hulme & Traxler, 2005; Ally, 2009). Mobile learning is considered a new and more flexible educational strategy where students have opportunities to review course content or communicate with their peers and instructors "anywhere," "anytime" without the restrictions of fixed-location computer technology (Caudill, 2007). An enhanced potential of e-learning, as observed by Kinshuk (2003), is now being realized with the advent of mobile learning tools. Mellow (2005) believes that the integration of mobile technologies in education will offer improved flexibility to students to suit their lifestyles. Although there is lack of agreement on a single definition, mobile learning, as defined by Keegan (2005), focuses on mobility where students may access education and training through devices such as iPods, PDAs, Palmtops and third-generation mobile phones.

McFarlane, Triggs, and Yee (2008) suggest that mobile learning can make a positive contribution toward teaching and learning. Learning is predicted to move more and more outside of the online or traditional classroom contexts thus becoming more situated, personal, collaborative and lifelong (Naismith, Lonsdale, Vavoula & Sharples, 2004). Some literature posits that the new generation of students considers technology to be part of their lives (Ally, 2007) and a steadily increasing number of today's students use their own personal mobile technologies (McGee & Diaz, 2007). If instructors intend to situate learning within the students' world, then ignoring the opportunities for mobile learning would run counter to the declared contemporary missions and practices of many universities (Tynan & Colbran, 2006).

Although it offers unique opportunities for instructors and students, mobile learning demands new educational approaches of delivery and facilitation (Corbeil & Corbeil, 2007), just as with earlier generations of e-learning transformation. Similarly, Cobcroft, Towers, Smith, and Burns (2006) suggest that adherence to pedagogical "best practice" must be central to any mobile learning project implementation. However, the pedagogical purposes for using mobile technologies have not been widely discussed in higher education (Herrington & Herrington, 2008). Such technologies bring challenges to instructors and institutions alike. Motlik (2008) suggests that education should now focus resource development on mobile technologies rather than the computer-centered Web. Compared to Internet-connected computers, the popular distribution of mobile devices is already familiar, easy-to-use and widespread among learners. Norris and Soloway (2008) argue that educators need to adopt mobile 21st-century tools for 21st-century learners. As matters now stand, education tends not to expose students to these tools, thus widening the technology gap between institutions and the learners they serve. Patten, Sanchez, and Tangney (2006) have analyzed the pedagogical underpinnings -- real and theorized -- for hand-held information and communication technology (ICT) tools. They argue that the unique affordances of hand-held devices should not simply be applied to replicating more efficiently the practices of earlier technologies. Instead, they should promote the creation of transformative strategies unique to mobile tool capacities.

The challenge for instructors and course designers lies in understanding and exploring how to facilitate mobile learning effectively and at the same time, to keep up with this changing phenomenon (Corbeil & Corbeil, 2007; Naismith et al., 2004). Becta (2004) suggests that institutions need to consider what training and technical support is required to support mobile teaching and learning effectively. Naismith et al. (2004) agree that training and dissemination of exemplary practice is needed to enable instructors to exploit the potential of mobile technologies for education. This paper aims to show in practice how three online instructors are exploring the use of mobile devices into their teaching activities while contributing to the further understanding of how mobile learning technologies can support teaching and learning. The following sections include a review of relevant literature followed by a description of the research questions and methodology. While presenting the findings, the paper addresses the collective experience of three online instructors, challenges faced by these educators, and the institutional response aimed at meeting these challenges.

Emergence of mobile practice

The integration of mobile devices into the curriculum necessitates a change in teaching approaches and strategies. Corbeil and Corbeil (2007), for example, conducted an informal survey with instructors to ascertain among other things their readiness to move from e-learning to mobile learning. The majority of participants affirmed that they were ready, though they were not yet integrating mobile technologies into their teaching activities. Meanwhile, Chan, Lee and McLoughlin (2006) found favorable results regarding the use of podcasting among a group of students, but suggest that widespread adoption of mobile technologies such as podcasting at the institutional level may generate resistance from instructors. In some cases, instructors may feel threatened by new forms of communication fearing their students' allegedly superior technological competence (Herrington & Herrington, 2008). Despite this, Chan et al. (2006) concluded that with the aid of the appropriate devices and resources, mobile technologies like podcasting can be integrated readily into the professional practice of higher education instructors.

The literature on mobile learning, however, carries some warning. Recognizing the display limitations of mobile devices, Huang, Kuo, Lin, and Cheng (2008) describe innovative models to support synchronous learner access to content using these tools. Weller, Bickar, and McGuinness (2008) report concerns about mobile delivery as a "push" technology that distributes content but enables very little communication about that content. They describe strategies to integrate mobile technology seamlessly with other tools that promote communication and production related to primary-grade curricular field

trips. Some observers view the newer communications technologies as unduly disruptive to education. For example, Elstad (2006) suggests that the dynamics of the technology-infused classroom reduces teacher control thereby creating a threat that students will carry out non-educational in-class activity with the communications devices made available to them.

Burke, Colter, Little, and Riehl (2005) reported instructors' experience with mobile device integration as overwhelmingly positive. However, the authors also found that many instructors did not yet know how to work with tools or integrate them into their teaching. They concluded that staff training was the most critical element affecting the success of their project. This finding is consistent with LeBaron and McFadden (2008) who argue for institutional support to guide instructors through the pedagogical challenges of technology integration. They suggest ongoing training, professional development, incentives, and human and infrastructure support. This echoes Attewell (2005) who views training as crucial for instructors since mobile literacy and familiarity with such devices may vary widely among individuals.

Researchers might legitimately ask if ubiquitous laptop computing any longer represents a viable future for ICT investment. With the burgeoning distribution of mobile devices connected to cellular telephone and wireless networks, laptops may represent a disappearing phenomenon. Swan, Kratoski, and van't Hooft (2007) have outlined the unique affordances of mobile devices, especially pointing to the fact that they are carried by virtually all young people, anywhere, and at any time around-the-clock. The failure of educators to acknowledge this reality will exacerbate the growing "disconnect" between schools and their constituencies.

This study aims to explore the integration of mobile devices into teaching practice through two separate audio interactions with three online instructors. It seeks to answer two questions: 1) What do instructors who are actually trying to embed the use of mobile devices into their teaching say about these efforts in terms of their own activities and the impact on students? 2) How should educational institutions support these initiatives?

Methodology

Three instructors from a mid-sized public university in the United States took part in the study. The institution is comprised of roughly 9000 graduate and undergraduate students and a full-time faculty of approximately 500. Instructors of all courses across the institution have access to a course management system. Many courses and whole degree programs are offered fully online; many more are offered in blended format. Like many universities, this one has experienced exponential growth in online learning over the past five years (Fig. 1).

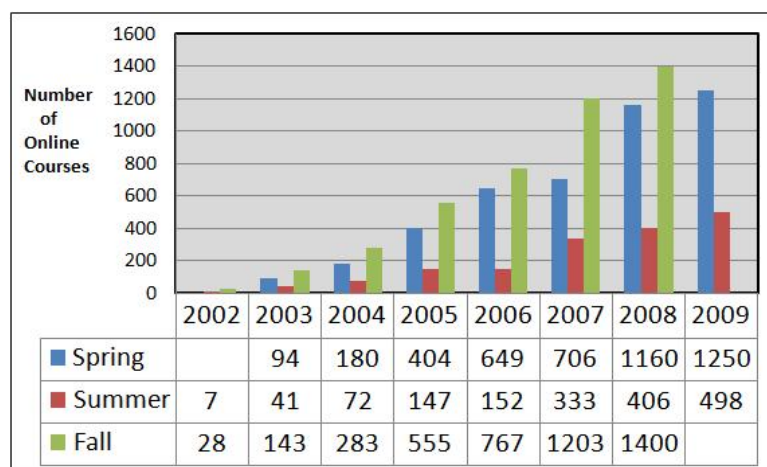


Figure 1. Growth of university's online course offerings.

Participants

The first instructor (Joseph) has been teaching both undergraduate and graduate courses for six years. Data were derived from his experience from two psychology courses taught in 2008: one online graduate course and one classroom-based undergraduate course. Both of these courses enrolled thirty students.

One course required the student production of podcasts; the second, the collaborative production of a wiki. The second instructor (Marta) has extensive secondary school and university teaching experience. At the university level, she has been teaching mostly graduate students for thirteen years. She recounts her experiences from two sections of the same graduate course in educational leadership aimed at mid-career educators spanning two semesters in 2007 and 2008. In both sections of this course, the instructor attempted to embed the production of instructional podcasts with other material contained in a learning management system (LMS). Nineteen students were enrolled in the first section of this graduate course; fourteen students in the second. Both sections were conducted fully online. The third instructor (Claire), who recently graduated with a Master's degree, has been teaching her first online course for one semester in which nine students were enrolled. Although this course was previously offered at the first-year level, several upper-level students were also enrolled. Her American History course included podcast lectures among a variety of other core course materials delivered in different ways. The three instructors have become familiar with various mobile devices. They all own iPods, iTouches and mobile phones.

Data collection and analysis

Two semi-structured interviews were conducted with all three instructors using the archiving tool of an audio conferencing utility within a learning management system. An initial round of individual interviews occurred in early October 2008. The intention was to discuss the topic researched while answering specific questions from a script prepared in the context of study objectives. These questions covered: a) instructors' background information, b) familiarity and use of mobile devices; c) instructional experience, successes and difficulties encountered; d) and perceptions of integrating mobile devices into teaching as well as the perceived views of their students. One of the researchers synchronously conducted the online voice interviews, which were conducted as one-to-one dialogues, while another researcher transcribed and analyzed the resulting content of the discussion.

Using the same audio conferencing tool, a second round of interviews was conducted in mid-June 2009 in order to assess perceptual changes in a fast-moving field of inquiry, and to discover particular faculty development needs and experiences not revealed during the first interview round. The second round was conducted as a collective focus group discussion rather than following the separate, individualized one-on-one conversations of the initial round. In the latter focus group discussion, interview questions focused on: a) changes in perspective resulting from longer and deeper teaching experience; b) particular training and faculty development needs; and c) the degree to which such needs have, or have not, been met by the support available from the instructors' home university.

These three case histories reflect the longitudinal experiences of the three subject instructors over time. The purpose of this inquiry is to ascertain relatively deep perceptions of field practitioners actually working to improve their eTeaching by incorporating newer mobile tools. This approach conforms to the qualitative research principles articulated by Merriam (1998). These perceptions may or may not agree with those produced by a broad-based survey from a large sample, but they reflect the valuable insights of course designers and talented e-teachers confronting daily instructional challenges in a changing world.

The two rounds of interviews were analyzed inductively following the suggestion of Merriam (1998) in which category construction began by reviewing the narrative that emerged from the voice interviews and making notes and comments on the margins of the resulting text. The next step involved grouping these comments and notes and identifying categories so that data could be coded as described by Lincoln and Guba (1985). After coding the data, themes and patterns relating to mobile device integration into teaching were examined accordingly. To ensure the trustworthiness of the data, triangulation occurred using a peer-check and member-check as described by Marshall and Rossman (2006).

Findings

The findings are organized in five sections which describe the three instructors' perceptions and experience with mobile devices integration, challenges and opportunities encountered, and current University services in place to support the move from e-learning to m-learning.

*Mobile devices integration in teaching*Joseph

Although Joseph has not yet fully integrated mobile devices into his teaching, he has taken the initial step of content material preparation. He has also had his undergraduate students producing podcasts. These course assignments were then uploaded into his students' iTunes University accounts. The next step would involve actually transferring this content into mobile devices but Joseph has not yet required his students to do this. He is cautious about doing so, because he believes there are procedural ambiguities to confront (e.g. student privacy) before making the transition from producing content potentially usable on mobile devices to actually exposing it publicly via podcasting. Joseph has also conducted a Scholarship of Teaching and Learning (SoTL) research project, which involved students producing podcasts instead of writing traditional term papers. Students produced visual, animation and other multimodal products to reinforce their text-based composition. Additionally, Joseph had graduate students creating other products such as a wiki that could be accessed from mobile devices.

It is worth noting that in Joseph's undergraduate course, out of 20 students queried, 16 did not know what the term "podcasting" meant. This reinforces one of the other researcher's separate finding that most of students in a graduate course (early-to-mid-career teachers-in-training) have not yet adopted mobile devices either for personal or for professional use. Sixteen of eighteen undergraduate students responded they never used podcasts while only two replied "yes." The authors have no reason to believe that their University is unique in this regard, and their findings call into question the universality of findings reported about the ubiquity of mobile device use among younger students (Ally, 2007; McGee & Diaz, 2007).

Marta

While Joseph's students produced podcastable digitized material, Marta created podcasts and stored them on her university's iTunes server for downloading. She knew that some of her masters-level students downloaded them to their iPods and listened to them. She encountered problems, however, with iTunes because students complained about excessive time to download, especially with larger video files. She eventually transferred these files to iMovie format and placed them on a different university-housed streaming server. In short, the instructor traded the mobility of podcasting for the speed and convenience of streamed video from a local server. After this, she received only one complaint about download speed. In order to prepare her sound files for class preparation, she is using a different tool called Recorder which she had earlier saved into her iPhone. It allows her to record almost any material in digital format. For example, she records voice feedback on students' assignments that supplements her written feedback.

Claire

Claire's lectures are enhanced podcasts but, similar to Joseph, she does not require students to use mobile devices. Students can, nevertheless, download the lectures and listen to them on their iPods. The audio channel of Claire's podcasts is illustrated by images that roll like slides as the audio is playing. If, however, students do not use a device that will display images, the audio channel will play on its own. Claire surveyed the students and discovered that the overwhelming majority of them downloaded the podcasts only onto their computers. Out of nine students, only one regularly downloaded the podcasts to an iPod. Claire is aware of how many students use mobile devices. About two-thirds of her students owned iPods. She is not sure about the reasons for students not "going mobile." She surmises they did not understand that her lectures could be downloaded to their iPods.

In the second round interview neither Claire nor Joseph felt that the integration of mobile devices in their teaching has necessarily led to a two-way type of interaction. To Claire, mobile learning basically constitutes a one-way delivery mechanism; it is almost like students receiving a classroom lecture. Joseph wants to by-pass the simple delivery of content. He believes that opportunities for engaging students in interactivity are possible through m-learning tools, especially using Web 2.0 tools. He acknowledges that he needs assistance on how to take advantage of the innovative potential of mobile learning in order to promote interactive assignments. In order to create such interactivity, Claire suggests that instructors are going to have to shift to richer media and multimedia presentation for their instructional delivery. In her case, moving to m-learning implies having her completely re-structuring the way she teaches. She believes she will have to start incorporating a lot of social media such as Facebook into the course to achieve a two-way interaction. Currently, the only way that her students can

communicate with one another is through the LMS. As for Marta, although she did not teach during the most recent semester, she was exposed to newer technologies, such as Second Life, that she feels may help her when she returns to active teaching. Additionally, she is anticipating the consequences of the University's ultimate migration to a new and different LMS which may offer links to Facebook and other mobile tools.

In addition to the lack of interactivity, Joseph thinks that m-learning as a whole remains an early trend that has not yet been embraced by a critical mass of University faculty. For instance, when he talks about m-learning to his colleagues, most do not know what that means. Claire believes that m-learning is going to prove interesting to online instructors only. To her, a small minority of instructors with high technological skills will perform a lot of "grass roots development" to help move m-learning forward; but for the majority of instructors, m-learning will stagnate. However, Claire suggests that m-learning would be more fully adopted if face-to-face instructors started to think about ways they could incorporate mobile devices into their teaching. More optimistically, Marta predicts that in 20 years m-learning will replace e-learning, a point that is not shared by Claire and Joseph. Claire does not think this will ever happen and mentions that e-learning has not yet replaced traditional teaching even though it seems to be contributing to its transformation.

Today's challenges and tomorrow's opportunities

In analyzing the integration of mobile devices into her teaching, Marta indicated that students judged podcasting and movies to be meaningful to them. Students also appreciated the voice feedback on assignments as added reinforcement for their work. She firmly believed that such integration has made a positive difference to her teaching. To Joseph, although his students could access and view everything that was created in the class on a mobile device, he does not know whether they literally transferred the material to such devices, and if they did, how this promoted their learning. To Claire, it is still too early to determine whether mobile device integration into her teaching has been successful. Her online course is in-progress and, to date, only one student has used mobile devices. Since she will be teaching the same course next spring, Claire has begun to review her own podcasts with the intention of improving them. She also anticipates implementing new strategies to encourage students to learn about and use mobile devices.

Later in the interview, Claire suggested that she has made her class materials more accessible. If these materials are conveniently retrieved, students will be more likely to use them productively. In the same vein, Marta affirms that mobile devices have the potential to democratize educational opportunity. She foresees prices dropping for such miniaturized devices; more people will own them thereby increasing educational access, thereby pressuring instructors and their institutions to distribute content to these tools. For the foreseeable future, a perpetually increasing proportion of such content will be digitally formatted and therefore downloadable to mobile devices.

Joseph adds that students can use mobile devices to review course material repeatedly and conveniently as necessary. As mentioned earlier, Joseph is concerned about the perceived "push-only" nature of mobile teaching and learning. To him, m-learning should be more than simply getting a lecture downloaded to an iPod. Additionally, Joseph suggests that a cultural change is needed across the spectrum of higher education. For example, he recently observed a televised program where a young girl was suspended from her high school class because she carried an iPod in a school that had banned them. What is needed, he said, is rethinking about the appropriateness and uses of iPods in the classroom so that communication devices routinely found in students' possession are put to productive educational use.

Perceived need for institutional support

All three instructors strongly agree that in order to successfully integrate mobile devices in teaching and learning, effective faculty development and training are needed. Joseph feels that one of the challenges faced by instructors is learning how the devices integrate with other, more familiar tools and practices. He suggests that faculty training takes time and should be offered in graduated segments based on a progressive mastery of specific tools. In addition to faculty assistance with digital media, the instructors expressed concern with the adequacy of student support, privacy rights, and the protection of intellectual property for students and instructors alike. For example, one of Claire's biggest challenges is to understand how much to support her students and how to anticipate their technology needs. If they are insufficiently helped in their use of mobile technologies, their home institutions need to establish back-up

assistance to assure students will meet learning goals with or without access to mobile devices. If sufficient institutional support is lacking, Claire recommends against “going mobile” because instructors should not divert attention from their scholarly responsibilities in order to focus on technical matters. In her view, if students progressively rely more heavily on mobile devices for their learning, universities need to respond by re-tooling their technical support to accommodate the accompanying technological transformation.

Joseph would like to see early m-learning faculty adopters start leading the way, disseminating their ideas across the University. In this respect, Claire considers herself to be an early adopter. In October 2008, she was delivering her lectures through iTunes to be downloaded on a MP3 player. Most of her students were also downloading her lectures from the University’s LMS to their laptops. In the past two semesters, including a summer course, she made her lectures available only on iTunes. She became aware that more students are listening to the lessons while they are on the move, such as when exercising or driving a car. She believes that students are adopting m-learning and feels that she is influential in leading the way.

Implications for training and faculty development

In their university, only one staff person is explicitly dedicated to providing support in developing digital media for the entire faculty. However, other skilled staff members devote part time work to faculty assistance with incorporating mobile technologies into their eTeaching. When initially interviewed, Joseph opined that this small staff contingent also assists a student body of several thousand. As increasing numbers of faculty and staff adopt mobile teaching techniques, this support shortfall will become more severe. Marta feels that the University is responsible for assuring such support. She suggests that the institution should purchase mobile devices for faculty who do not now possess them. Marta believes that mobile device integration across the University’s range of networked teaching and learning requires a dedicated budget, personnel support, instructional development and technical training.

University array of services

The University where Marta, Joseph and Claire teach has gradually implemented an array of services for e-teaching training and support. These services are offered in the institutional context of a University Faculty Center (UFC), and will be adapted to the growing migration toward mobile-based technologies. Mindful of the research on institutional and professional development, instructors themselves are substantially involved in the design and execution of professional development as program developers, role-models and peer mentors (Rogers, 2003; Joyce & Showers, 2002; Loucks-Horsley & Hergert, 1985). In this way, active client faculty members supplement the contribution of the solitary digital media support person. The University Faculty Center organizes its training and teaching development around ten discrete programs. A small sampling is outlined below:

- The Online Course Assessment Tool (OCAT). A web-based vehicle through which faculty members may access for quality of their online teaching and course design. This tool may be used either for self-assessment or for peer coaching. See http://www.wcu.edu/WebFiles/PDFs/facultycenter_OCAT_v2.0_25apr07.pdf.
- The eLearning-eMentor Program. Through this web-based service, experienced volunteer faculty members make themselves available to less experienced client colleagues, who desire assistance with electronic course design and teaching. See <http://www.wcu.edu/7515.asp>.
- Online course development day. Several times throughout the academic year, daylong workshops are provided wherein faculty members may work with staff and with colleagues on specific challenges related to course design. Some of these challenges focus on the integration of mobile learning strategies. See page two of the following document: http://www.wcu.edu/WebFiles/PDFs/CFC-eTeach-Help_080814.pdf.
- The “Faculty Sandbox.” This facility is a homelike physical space dedicated to providing faculty with ongoing support on the latest, most innovative instructional technology the sandbox specializes in digital media, Web-based software programs and supports the creation of Web-ready documents. See <http://www.wcu.edu/7509.asp>.

A more comprehensive narrative of Faculty Center support for e-learning and m-learning may be found at http://www.wcu.edu/WebFiles/PDFs/CFC-eTeach-Help_080814.pdf.

How have UFC services impacted the attitudes and practices of Marta, Joseph and Claire? Marta stresses that the University offers a successful professional development model created within the UFC. It is an online course development structure that brings together all of the resources of the Faculty Center to promote innovation. The model supports groups and individuals, and encourages faculty to move forward with more advanced technologies such as Second Life regardless of sophistication or prior experience. Joseph feels that small group support allows for presentation of specific teaching techniques. For example, he sees a benefit in faculty demonstrations of instructional strategies. To Claire, the Faculty Center is a place where faculty members may be exposed to innovative peer instructional techniques; instructors are perpetually exploring new teaching methods. Joseph affirms that faculty members value the opportunity to showcase their accomplishments. Marta believes that explicit training and professional development is needed for leading faculty to serve as trainers and role-models for the critical mass of peers who will follow them toward m-learning adoption.

Discussion

This paper has illustrated the implications of integrating mobile devices into teaching by exploring the experience and views of three university instructors. Findings indicate that such integration holds promise but that much instructional potential remains to be tapped; however, the three instructors appear to be defining the nature of that potential. They demonstrated a growing familiarity with mobile instruction and a keen willingness to keep up with the changing world of teaching and learning. Findings also show that a number of challenges exist, which are consistent with those discussed in the literature (e.g. Becta, 2004; Burke et al., 2005; LeBaron & McFadden, 2008). Through their narratives, it became evident that these leading faculty members require professional development and technical training to familiarize themselves with mobile devices, while, at the same time, understand ways to integrate them into their teaching and to disseminate their growing skill-set to teaching peers. Figure 2 depicts the major findings arising from the data analysis.

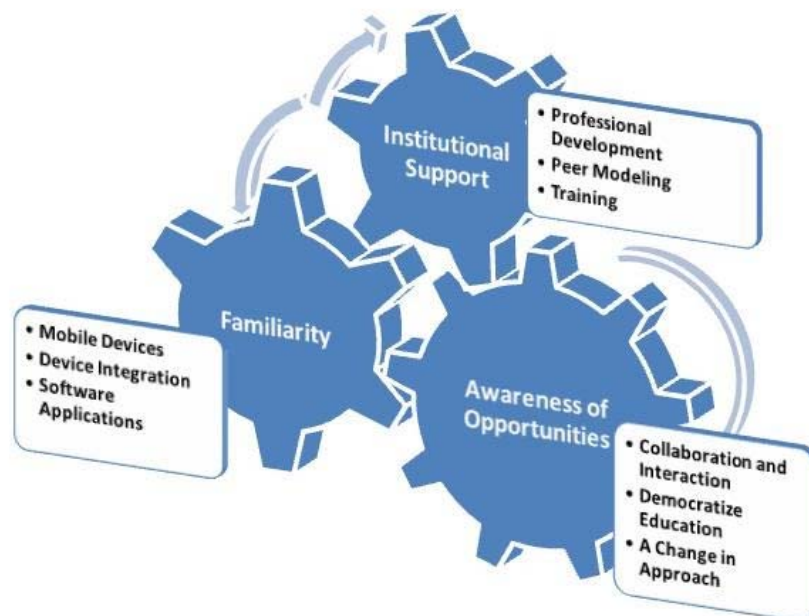


Figure 2. Criteria necessary for “switching gears” from e-learning to m-learning.

Instructors’ awareness of opportunities to engage in peer collaboration, to build a knowledge-base of applications leading to equal access for all students, and to construct a repertoire of innovative approaches focused on m-learning pedagogy are perceived by study participants as most important for moving toward this particular type of instructional focus. Instructor familiarity of mobile devices was also recommended by the study participants. Regarded as particularly beneficial for instructors is knowledge of the various types of mobile devices on the market today, ways in which these devices integrate with

existing technology, and availability of software that supports and enhances the experience of learning. Lastly, study participants recognized the need for institutional support and commitment, particularly in the areas of professional development in using these technologies, peer-modeling by early-adopting faculty already using these devices and techniques, and training and support in implementing this approach.

All three instructors have clearly stressed their concerns that insufficient personnel exist to provide necessary assistance to realize the potential of m-learning. Another challenge focuses on the provision of network and technological infrastructure sufficient to support faculty and students alike. This study also raises the question of whose responsibility it is to provide mobile devices for instructors to implement m-learning effectively into their teaching. Similar concerns have been found in the literature (e.g. Naismith et al., 2004).

Much m-learning literature posits the importance of designing electronically networked courses in a manner that reaches students where they typically use networked technology in their personal lives. This issue appears to be somewhat more complex than it appears on the surface. Contrary to received wisdom, the study participants discovered that, if anything, some of their students are less experienced and knowledgeable about mobile communication, particularly podcasting, than are some of their instructors. Therefore, designing networked learning targeted explicitly for mobile access may be missing the intended population target. However, these "snapshot" findings cannot predict the future. Prudent practice suggests that universities should be planning now for the infusion of teaching designed for mobile learning, in order to be prepared for an imminent, radical change in student routines.

This study has addressed practical concerns that universities should take into account in order to support faculty in making the transition from e-learning to m-learning. Due to the small study sample, however, the potential for generalization is limited. Future research could survey larger and more diverse teaching populations to allow more solid conclusions. An additional limitation is the use of a unitary data source. Although the interviews allowed exploring rich and in-depth information, using survey or other data collection techniques would help strengthen the findings. This study covered only the instructors' side. Analysis of students' perceptions and experience of using mobile devices to support their learning should drive future research on m-learning.

These rich narratives have, as suggested by Naismith et al. (2004), described nascent innovations which may help other instructors to explore the potential of mobile devices in teaching. In addition, the study has presented an array of services that the participants' university offers to support e-learning which are now being adapted to support mobile teaching and learning. Findings also suggest that pioneering instructors such as Claire, Marta, and Joseph are well-positioned to serve as role models to those with less experience and willing to use mobile devices in their teaching. A challenge for the University is to devise strategies to capitalize on their talent systemically in order to diffuse the lessons learned from their pioneering effort.

Conclusions

By exploring the experiences and views of three instructors on mobile device integration into their teaching, this paper revealed that there were both opportunities and challenges involved with such integration. While the instructors viewed m-learning optimistically, issues need to be addressed to enable effective institutional diffusion of mobile devices into teaching and learning. These issues include training, professional development and technical support. The three instructors interviewed in this study felt ready to incorporate m-learning into their teaching, yet perceived that they lack the cognitive schemas for implementing m-learning techniques and strategies systematically into their instruction. Moving from simple content delivery toward increased interactivity was perceived as a struggle. Moreover, all of the study participants warned that beyond technical and pedagogical support, the University also needs to address the cultural change inherent in society's overall migration from classrooms and computers toward mobile communications. Migrating from the low-level instructional function of mere content delivery towards a more student-centered approach will necessitate the demand for institutional resources aimed specifically at fulfilling the higher-order aspirations expressed by instructors who wish to successfully navigate the waters of mobile learning.

References

- Ally, M. (2007). Mobile learning. *The International Review of Research in Open and Distance Learning*, 8(2), pp. 1-4. Retrieved September 12, 2008, from <http://www.irrodl.org/index.php/irrodl/article/view/451/918%20%20>
- Ally, M. (2009). *Mobile learning: Transforming the delivery of education and training*. Edmonton, Canada: Athabasca University Press.
- Attewell, J. (2005). From research and development to mobile learning: Tools for education and training providers and their learners. Proceedings of mLearn 2005, Retrieved September 14, 2008, from <http://www.mlearn.org.za/CD/papers/Attewell.pdf>
- Becta. (2004). What the research says about portable ICT devices in teaching and learning (2nd ed.). Coventry, UK: Becta ICT Research. Retrieved August 2, 2008 from http://partners.becta.org.uk/page_documents/research/wtrs_porticts.pdf
- Burke, M., Colter, S., Little, J. & Riehl, J. (2005). Utilizing wireless pocket-PCs to promote collaboration in field-based courses. mLearn 2005, 4th World Conference on m-learning, Retrieved September 14, 2008, from <http://www.mlearn.org.za/CD/papers/Burke.pdf>
- Caudill, J. (2007). The growth of mLearning and the growth of mobile computing: Parallel developments. *The International Review of Research in Open and Distance Learning*, 8(2), Retrieved July 15, 2008, from <http://www.irrodl.org/index.php/irrodl/article/view/348/873>
- Chan, A., Lee, M. & McLoughlin, C. (2006). Everyone's learning with podcasting: A Charles Stuart University experience. Proceedings of the 23rd Annual Ascilite Conference: Who's Learning, Whose Technology?, Retrieved August 15, 2008, from www.ascilite.org.au/conferences/sydney06/proceeding/pdf_papers/p171.pdf
- Cobcroft, C., Towers, S., Smith, J. & Burns, A. (2006). Literature review into mobile learning in the university context. Retrieved September 25, 2008, from <http://eprints.qut.edu.au/archive/00004805/01/4805.pdf>
- Corbeil, J. & Corbeil, M. (2007). Are you ready for mobile learning? Frequent use of mobile devices does not mean that students and instructors are ready for mobile learning and teaching. *Educause Quarterly*, 2, pp. 51-58.
- Elstad, E. (2006). Understanding the nature of accountability failure in a technology-filled, laissez-faire classroom: Disaffected students and teachers who give in. *Journal of Curriculum Studies*, 38(4), 459-481.
- Herrington, A. & Herrington, J. (2008). Authentic mobile learning in higher education. AARE 2007, Australian Association for Research in Education, Retrieved June 4, 2008, from <http://www.aare.edu.au/07pap/her07131.pdf>
- Huang, Y., Kuo, Y., Lin, Y., & Cheng, S. (2008). Toward interactive mobile synchronous learning environment with context-awareness service. *Computers & Education*, 51(3), 1205-1226.
- Joyce, B. & Showers, B. (2002). *Student achievement through staff development*. (3rd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.
- Keegan, D. (2005). The incorporation of mobile learning into the mainstream education and training. mLearn 2005, 4th World Conference on m-learning, Retrieved September 17, 2008, from <http://www.mlearn.org.za/CD/papers/keegan1.pdf>
- Kinshuk. (2003). Adaptive mobile learning technologies. 2003, Retrieved September 1, 2008, from <http://www.whirligig.com.au/globaleducator/articles/Kinshuk2003.pdf>
- Kukulska-Hulme, A. & Traxler, J. (Eds.). (2005). *Mobile learning: A handbook for educators and trainers*. London: Routledge.
- LeBaron, J. & McFadden, A. T. (2008). The brave new world of eLearning: A department's response to mandated change. *Journal of Interactive Learning Environments*, 16(2), pp. 143-156.
- Lincoln, Y. & Guba, E. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage Publications.
- Loucks-Horsley, S. & Hergert, L. (1985). *An action guide to school improvement*. Alexandria, VA: Association for Supervision and Curriculum Development.

- Marshall, C. & Rossman, G. (2006). *Designing qualitative research*. Thousand Oaks, CA: Sage Publishing.
- McFarlane, A., Triggs, P. & Yee, W. (2008). Researching mobile learning. Retrieved September 9, 2008, from http://partners.becta.org.uk/upload-dir/downloads/page_documents/research/mobile_learning.doc
- McGee, P. & Diaz, V. (2007). Wikis and podcasts and blogs, oh my! What is a faculty member supposed to do? *Educause Review*, 4(5), pp. 28-41.
- Mellow, P. (2005). The media generation: Maximize learning by getting mobile. Retrieved August 15, 2008, from http://www.ascilite.org.au/conferences/brisbane05/blogs/proceedings/53_Mellow.pdf
- Merriam, S. (1998). *Qualitative research and case study applications in education*. San Francisco, CA: Jossey-Bass.
- Motlik, S. (2008). Mobile learning in developing nations. *International Review of Research in Open and Distance Learning*, 9(2), 1-7.
- Naismith, L., Lonsdale, P., Vavoula, G. & Sharples, M. (2004). NESTA Futurelab Report 11: Literature review in mobile technologies and learning. Retrieved July 1, 2008 from http://www.nestafuturelab.org/research/reviews/reviews_11_and12/11_01.htm
- Norris, C., & Soloway, E. (2008). Handhelds: Getting mobile. *District Administration*, 44(8), 20-24.
- Patten, B., Sanchez, I. A., & Tangney, B. (2006). Designing collaborative, constructionist and contextual applications for handheld devices. *Computers and Education*, 46(3), 294-308.
- Rogers, E. (2003). *Diffusion of innovations*. (5th ed.). New York: Free Press.
- Swan, K., Kratcoski, A., & van't Hooft, M. (2007). Highly mobile devices, pedagogical possibilities, and how teaching needs to be reconceptualized to realize them. *Educational Technology Magazine: The Magazine for Managers of Change in Education*, 47(3), 10-12.
- Traxler, J. (2007). Defining, discussing and evaluating mobile learning: The moving finger writes and having writ. *The International Review of Research in Open and Distance Learning*, 8(2). Retrieved July 15, 2008, from <http://www.irrodl.org/index.php/irrodl/article/view/346/875>
- Tynan, B. & Colbran, S. (2006). Podcasting, student learning and expectations. Proceedings of the 23rd Annual Ascilite Conference: Who's Learning? Whose technology? Retrieved August 15, 2008, from www.ascilite.org.au/conferences/sydney06/proceeding/pdf_papers/p132.pdf
- Weller, A. M., Bickar, J. C., & McGuinness, P. (2008). Making field trips podtastic!: Use of handheld wireless technology alleviates isolation and encourages collaboration. *Learning & Leading with Technology*, 35(6), 18-21.

Manuscript received 25 Aug 2009; revision received 21 Jan 2010.



This work is published under a Creative Commons Attribution-Non-Commercial-Share-Alike License

For details please go to: <http://creativecommons.org/licenses/by-nc-sa/3.0/us/>