Uncoupling Mobility and Learning: When One Does Not Guarantee the Other

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Abstract. Mobile learning was an embedded component of the pedagogical design of an undergraduate course, *Digital media and society*. In the final semester of 2010 and the first semester of 2011, 135 students participated in an empirical study inquiring into their perceptual experience of mobile learning. To control for access to technology, an optional iPad student loan scheme was used. The iPads were loaded with an electronic textbook and a mobile application of the learning moderation system. Eighty students participated in ten-person focus groups. Feedback on mobility and the electronic text was positive and optimistic. However, the majority of students were not convinced that the trial made a difference to their learning. This result was interpreted to indicate that the presence or absence of mobile devices does not guarantee or preclude student learning.

1 Introduction

There are two components of the coupled term, mobile learning. Mobility refers to the untethered nature of the student experience. Devices such as smart phones, tablets, netbooks, and iPads make learning materials light-weight and portable. Mobility also means that students can access the internet anywhere, anytime, provided that they also have access to a wireless or 3G network. “Mobile devices open up new opportunities for independent investigations, practical fieldwork, professional updating and on-the-spot access to knowledge” [1]. Mobile access to the internet can provide the opportunity to engage in the tasks that these authors listed. These pedagogical processes are part of the repertoire of the constructivist educator, engaging the students in hands-on inquiry [2-6]. These tasks are part of the pedagogy of the higher educator and intended to promote learning.

Learning is the second element of the compound term. Educational theorists argue against offering a blanket definition of the term, writing that "learning is always the learning of something" [7]. In other words, to say that a student has learned communication, one of the measured components is the demonstration of oral and written proficiency. In accordance with this theoretical perspective, the generalised assumption of mobile learning is problematic from the outset. “The feature of 'mobility' can seem a curious way to delineate a field of research on learning" [8]. The definition of mobile learning cannot be simplified into compounding the two terms [9]. The problem is that in English grammar, the side-by-side arrangement of the two

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words makes mobile the adjective of the noun learning. So, just as *quiet riot* means silent chaos, *mobile learning* connotes the meaning of portable educational process. The problem is that mobile learning may be just as much an oxymoron as quiet riot.

Belief in the legitimacy of the combined term, mobile learning, is widely apparent in the literature. Many educators claim student use of mobile technologies improves their learning [10]. Many of the reviewed studies in mobile learning "assume that handheld computers will be beneficial in a classroom environment" without rigorously considering and testing this assumption [11]. An example of the linking of mobile devices and learning is demonstrated in a quote such as, "with the proliferation of mobile devices, there is also great potential to harness mobile technologies to enhance learning" [12]. Some researchers claim mobile learning is distinctive from previous approaches to teaching and learning with technology because mobile devices liberate the learner to realise enactment of anywhere, anytime learning [4]. The widespread belief in the efficacy of mobile learning necessitates a research call to investigate the propositions, perceptions and outcomes.

While the literature revealed numerous claims that there was a pedagogical link between *mobile* and *learning*, there did not seem to be robust empirical evidence that this assumption was tested. Research into mobile learning is described as "maturing" as no "explicit frame exists as yet to guide the choice of research methods and the tools for data analysis" [13]. This depiction of the state of mobile learning research necessitates an exploratory study.

Four key questions emerged during analysis of the mobile learning literature. The first question is whether students perceive that the use of mobile devices in their university education makes a difference to their learning. The second question is whether students are already using mobile devices in their learning experience and if so, which students. The third question is whether the students' assignment scores are higher when they are using mobile devices (as an indicator of heightened learning). The fourth question is whether there is a significant difference in the final grades of students who do and do not use mobile devices.

All four questions cannot be comprehensively addressed in a single paper. Therefore, this paper has been designed to address the first question regarding student perception of learning related to the use of mobile devices. The final three questions regarding extent of student technology use and the effect of mobile learning on achievement and grades will be addressed in subsequent papers.

2 Method

The undertaken project was framed as design-based research (DBR) [14-15]. Design-based research is a method geared towards bridging educational theory and practice, with the aim of understanding how students learn within their natural settings (school/university). One of the main advantages of this method is that research and learning have a symbiotic relationship, as research can be enhanced through the study of scholarship, which in turn can enrich and refine the learning process [14]. In order to answer the defined research questions regarding the students' actual experiences and their perceptions of those experiences, it was important that the research conditions did not interfere with the integrity of their phenomenology as

undergraduate university students. The primary reason DBR was selected as research methodology was that there is no manipulation of experimental conditions. The students, as volunteer research participants, spent no more time than normally spent engaged in class activities, and the conditions of the study were naturalistic, or what one would ordinarily expect in a university classroom facilitated by this particular educator. The only difference was that a loan scheme ensured that all students had use of iPads loaded with the electronic textbook and a mobile application of the learning moderation system (LMS). Also in keeping with the DBR method, student use of mobile devices must be consistent with regular timeframes and locations. Use of mobile devices spans formal and informal settings [16]. In other words, it is not normative for students to only use mobile devices while at university and only for the applications defined by the educator. In order to be true to the methodology of this study, students had free reign with the mobile devices during the loan period. They were free to take them home and to load whatever applications they wished during the loan period.

A total of 135 students enrolled in an undergraduate subject titled *Digital media and society* in the final semester of 2010 and the first semester of 2011. The pedagogical design of this subject was such that the educator used a combination of face-to-face teaching methods such as lecture and discussion and online methods such as immediate internet search and online formative assessment. The students were invited to use their own mobile devices such as laptops, smart phones and tablets to participate in the digital components. To ensure that every student had access to mobile technologies, each student was also assigned to a loan schedule whereby an iPad was made available for university and home use for a two-week period. The iPad was loaded with an electronic copy of the normally assigned textbook and an application to afford mobile access to the LMS.

As the key data collection instrument of the DBR process, the students were invited to participate in focus groups conducted during regularly scheduled tutorial times. The focus groups were designed to enable interpretive inquiry using a phenomenological hermeneutic framework [17-18]. Phenomenology means the actual lived experience of the participants. Hermeneutics is named for the Greek Hermes who was the mythical messenger for the gods, translating meaning so that mortals could understand. Combined with phenomenological experience, hermeneutics enables participants to describe experiences, and researchers to interpret meanings of those experiences. Specifically, students were not asked survey-type questions with multiple choice or closed-ended responses. Instead they were asked to comment on and discuss their experiences. This allowed the respondents to reflect on their actual experiences and co-created meanings through shared discussion, as opposed to forced choices or being influenced by the theoretical propositions of the researchers. Researchers writing about DBR emphasized that interaction among students, such as that through the focus group process was instrumental to the formation of subjective interpretation. The synergy and collaborative nature of group discussion is a key catalyst in the creation of an ongoing, cumulative discourse [19]. With respect to learning, it is more revealing to ask students to describe their experiences and perceptions of the use of mobile devices and observe whether learning emerged as a volunteered topic, rather than directly ask students whether they learned, which would force their response.

There were eight focus groups in total. Each had ten participants. The ten participants were those who had just returned iPads from the loan scheme. Each focus group was one-hour long. Set general themes were pursued in each focus group. The focus groups were designed to inquire into the students' experience of using the iPads and other mobile devices, and their opinions about mobile learning. Beyond these general themes, the group members carried the conversation in unique directions. All discussions were recorded on a voice recorder and transcribed for analysis.

The data was coded and analysed using NVIVO 8, a qualitative data analysis software. Two levels of analyses were conducted. At the first level, five common themes in the transcripts were identified by the researchers: utility of the iPad, advantages of the iPad, disadvantages of the iPad, experience of using the electronic textbook, and opinions on mobile learning. At the second level of analysis, these five themes were recorded as 'nodes' in NVIVO 8 and students' opinions were coded under each respective node.

3 Results

3.1 Class Demographics

There were 135 students, predominantly female (64%) undergraduates enrolled in a required subject for a major in communication and media in one of two semesters between September 2010 and May 2011. The mean age was 22 years with a range of 19 and standard deviation of 3.9 years. Almost all (96%) brought a mobile phone to class, almost half (48%) brought to class a laptop (only 4% of these were netbooks) and few (4%) brought a tablet computer to class. Mobile phones used by students were mostly internet enabled (73%). Of those phones with either Wi-Fi or 3G or EDGE Internet access, students reported that 80% were primarily used for social networking, 75% for web browsing and 68% for email.

All but one student came to class stating that they were already subscribed with a Facebook account. Half had a Twitter account and one fifth had Linkedin accounts. Use of mobile phones and laptops were evenly split during class time with half stating they regularly use their phones and half use their laptops. Of the students who state they bring their laptops to class, half stated that primarily, they used the university's LMS, half that they use their laptops to take notes, half state that they go on Facebook, a third stated that they access Wikipedia and a third texted at some stage during class. Screens were used heavily for composing and reading, although e-books were preferred by few (11%).

Despite these tech-heavy frequencies among this sample of students, only 14% identified themselves as "power users" of information and communication technologies and 36% described themselves as tech-savvy. The majority (46%) said they were merely "tech-users." Tellingly, none self-identified with the label "tech-resister."

The final grade distribution for these students was slightly skewed with 40% earning a "Pass", 28% a "Credit", 20% a "Distinction", 7% a "Fail" and 5% a "High Distinction."

3.2 Applications Loaded on Loaned iPads

As a sample of the research participants, 38 students were asked to identify which applications they downloaded on the loaned iPads. The majority (28 students) failed to indicate any downloaded applications. Ten students indicated that they downloaded applications. There were a total of 25 downloaded applications, four of which were downloaded by more than one student. The most popular applications at three downloads each were: Angry Birds and Words with Friends. Two students indicated that they downloaded Facebook. Notably, two students indicated they downloaded the Blackboard Mobile Learning Application, even though this was pre-loaded on all of the loaned iPads. Single downloads were indicated for: Seek, Air Asia, Fruit Ninja, Piano, Workout, TED, The Age, Google Earth, Dropbox, Skype, WordPress, Bejewelled, Paradise Island, Friendly Facebook, eBuddy, Wall Street Journal, Twitter, ESPN Magazine, Hearts, Euchre and Solitaire.

3.3 Focus Group Results

Eighty of the students elected to loan iPads and participated in a focus group at the conclusion of their loan period. The major themes that appeared through qualitative analysis of the focus group transcripts were: the utility of the iPad, the advantages and disadvantages of the iPad, the experience of using the e-textbook and general opinions on mobile learning.

Utility of the iPad. Students reported using the iPad for seven functions. Four of these can be categorized as education-related activities. These functions were: checking the LMS, browsing the internet, checking emails and reading blogs. The students did not indicate the proportion of the sites they browsed that were related to their studies, nor the extent to which emails were sent to and/or received from their educator and peers related to curricular content and process. The three other non-educational functions were playing games, internet shopping and social networking. Notably, social networking is now increasing in popularity as a vehicle for higher education pedagogy. This was not the case in the researched *Digital media and society* subject; this function was therefore classified as non-education activity.

Advantages of the iPad. Overall, many of the students were enthusiastic about their esteem for the iPad. Two of the descriptors used by students were "sick" [a slang expression meaning excellent] and "revolutionary." No limits were imposed on the students in regard to use of the iPads. Students with iTunes accounts loaded additional apps on the devices and commented on "seeing all the cool stuff it can do." Other volunteered attributes of the iPad held in esteem were the "long battery life" and the screen size, said to be "good for games." Some students specifically addressed learning using iPads, describing interactivity and "learning-on-the-go" as advantages.

There was extensive discussion on the potential use of iPads as a lightweight library of textbooks. Numerous students commented on the size and weight of the iPad, saying that it was easily portable. A student said, "if it had all our text books in there, I wouldn't need a back pack." Another student said, "you know, like we're in a

class here and then you got to go to the library to study. It's just easier to carry one little thing than like a stack." One participant linked the iPad to sustainability, in that fewer books would be published in the future, thereby reducing use of paper.

Disadvantages of the iPad. While the students listed numerous advantages of the iPad, as described above, the students were no less vocal regarding their perception of disadvantages. The majority of the complaints regarded features that the students believed that the iPad should have, but does not. These missing features included: USB port, Microsoft Word, camera, flash, chat functions and 3G. It should be noted that a word processor is available as an app on the iPad and that iPads may be purchased with or without 3G, but that these features were not made available on the loaned iPads. Numerous students also commented that typing on the touch-screen keyboard is not comfortable and is error-prone.

A number of students volunteered the information that they will not be purchasing iPads. Some students said that they prefer their laptops. Others said that the iPad did not hit a target function in that it is "not quite a computer and not quite a phone." Some students indicated that they were reluctant to buy soon because Apple will "keep updating them." A common theme was that the iPad was a novelty, but not a valid educational tool. "I enjoyed the novelty of it, um, but I didn't use it for any sort of work or any study." Some other students described the iPad as a "massive distraction."

Experience of Using the Electronic Textbook. Whereas there were minimal comments specific to use of the mobile LMS application, the electronic textbook provoked extensive commenting, the majority of which was positive. A minority of students criticized the electronic version of the book, stating that navigating through the book was "awkward" and/or stating that they prefer to read from paper.

The general portability of the electronic textbook was addressed and numerous design features held in high esteem. In regards to portability, one of the students who commented on this element said, "I liked it because it just sort of gave a different screen - sit in bed and read it rather than having to sit on a desk under the light." Other students described the electronic textbook as "easier." Some of the functions they commended were: highlighting, searching, dictionary and bookmarking. Numerous students described the format of the book as "engaging." One student said, "people will engage with already doing something, like it's a game."

Opinion on Mobile Learning. Overall, general opinion about mobile learning was positive. Emphasis was on the functional capacities of mobility. Students stated that use of mobile devices is more efficient than that of immovable and print resources. Many students forecasted that mobile devices would replace textbooks. Students particularly liked the environmental impact, saying that there would be "no need to be killing trees." Other forecasts were for the lowering of costs of devices and electronic books. They believe that more material will be available online and thus, mobile learning will become more convenient. Some students said that mobile learning was a

good way to engage students, as it was interactive. Some students said that mobile learning should be integrated into the curriculum and that there should be tutorials on how to "use it." Others stated that mobile learning was "not vital" with still others qualifying that it is "more beneficial to take pen and paper notes."

4 Discussion

The overall impression of the summarized transcripts is that students were device-focussed. They considered the utility of what it could and could not do, and much of the discussion of functions considered non-educative features, such as the screen-size being large enough for good game graphics. Much of the dialogue clustered into themes that might be summarized as mobility features. Students discussed portability and compared the light-weight feature of the devices compared to bags filled with heavy texts. There was very little discussion about how students used the mobile devices in learning activities. The comment that it is "more beneficial to take pen and paper notes" might be interpreted to mean that the only student-perceived purpose of having a mobile device in class would be to key-in notes. Students did not address collaboration, intellectual debate or comparing and contrasting online sources of information. Higher level learning tasks did not appear to be made salient through the loan of iPads.

While there are numerous educational apps available for download, these are not what this group of students downloaded. Those students who downloaded apps, downloaded games. This is particularly notable when considered in context with the student profile. This group of students were positively skewed towards high grade achievement. They were almost unanimously frequent technology users.

The results might be interpreted as somewhat disappointing. The impetus for this research was assurance of learning. The researchers wanted to know whether the introduction of mobile devices into teaching would positively impact student learning. The hypothesis of this component of the study was that students would perceive a qualitative correlation between the use of mobile devices and learning. While the students enjoyed the experience of trialling the iPads, there was no strong evidence that they perceived a significant contribution to their learning. The question to consider is why not? To unpack this question, we look to the promise of mobile learning. Researchers wrote, "mobile technologies can support learning that is more situated, experiential and contextualised within specific domains and they support the creation and use of more up-to-date and authentic content" [1]. In other words, the authors are advocating an inquiry-based pedagogy, which means that the students are engaging with real-world content in active processes that resemble those used by industry professionals [20]. Herein rests the answer to the puzzle of why the students did not report a substantive difference to their learning. Sometimes a failed hypothesis is more informative than a confirmed hypothesis, because the puzzlement disrupts established relationships between phenomena and set patterns of thinking. The failed hypothesis causes us to look at the data in a new way.

In this case, the reason why students may not have reported enhanced learning as a result of iPad use is because the conceptions of teaching and learning, and therefore the implicit pedagogy, overrides the specificities of whether the teacher and learners

are or are not using mobile devices. In other words, this particular educator is going to teach in creative ways, and the majority of learners enrolling in a class on *Digital media and society* are going to be open to thinking outside of the box no matter what. Researchers examining multiple mobile learning empirical studies wrote, "while new technologies can offer new and creative modes of learning, the primary educational goals remain the same: to equip students with a set of skills and knowledges that will help prepare them for later life" [11]. Evidence from student evaluation of teaching surveys and from peer observation of teaching pro-formas indicate that the educator in question has a developed philosophy of teaching, engages his students in active learning and provokes thinking through approaches such as Socratic questioning. The educator in question was the Head of School of Communication and Media. He was brought to the university in order to design and develop a program in emerging technologies and he started a multi-media, active learning lab for the students. In student evaluation of teaching surveys conducted over 3 years (2007-2009), 14 subjects, and 432 students, he achieved a mean score of 6.4/7 in response to the question, "All things considered, how would you rate the effectiveness of this teacher in this subject." In summary, the introduction of mobile devices into this particular classroom did not make a significant difference to pedagogy or perceived learning.

5 Conclusion

The conditions of the described design-based research were such that 135 students enrolled across two semesters of an undergraduate class in *Digital media and society,* were invited to borrow iPads for two-week periods. The results of qualitative analysis of their post-loan impressions revealed that they enjoyed the experience. What the data did not indicate was that the students perceived a large-scale impact on their learning. Interpretation of the results led the researchers to re-examine the context of the inquiry. It is believed that the perception of learning impact was not present because the pedagogy was not shifted by the use of mobile devices. The students experienced the same quality of teaching and therefore perceived an equivalent contribution to their learning.

Was this therefore a failed trial? Should the researchers have selected a less experienced educator with a weaker pedagogy? The emerging hypothesis is that student perception of learning impact would still be absent. The lesson is that mobility does not equate to learning. The introduction of mobile devices into the classroom is not a 'golden ticket'. The authentic independent variable is the collection of pedagogical decisions that the educator puts into play in deciding whether, when and how to use the mobile devices. There was value-added in this educator introducing the iPads into his undergraduate class. The benefits, however, did not magically appear by virtue of their being mobile devices. The strength of the approach was that the introduction of new technologies provoked the educator's thinking about how he could apply the affordances of a searchable text and same-time access to the internet by multiple users. For the students, particularly in the context of digital media, introduction of mobile devices provided another opportunity for reflection and critique. This exploration into mobile learning revealed that this term is more than hyperbole when grounded in mindful pedagogy.

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