Identifying discriminating variables that determine mobile learning adoption by educators: An initial study

Kathryn MacCallum
School of Information Technology and Computing
Eastern Institute of Technology Hawkes Bay
Lynn Jeffrey
Dept of Management and International Business
Massey University, Albany

Given the prevalence of mobile devices in everyday life and recent interest in using mobiles in education, it is critical to understand teachers' perspectives regarding mobile technology and its possible integration in their teaching. Therefore a small scale study (n=42) was conducted on a group of tertiary educators from around NZ in order to provide an initial idea of the attitudes, characteristics and variables that best discriminate educators attitudes towards the inclusion of mobile technology into learning. The study was also aimed at highlighting some of the key advantages and barriers that mobile technology offers to education from an educator's perspective. The concepts highlighted in this study aim to identify key areas that play a part in educator's adoption of mobile technology and will provide the basis for a wider survey.

Keywords: mobile learning, mobile technology, educators, attitudes, adoption, benefits, barriers

Introduction

The term mobile learning (m-learning) refers to the use of mobile and handheld IT devices, such as Personal Digital Assistants (PDAs), mobile telephones and MP3 players, in supporting teaching and learning. As computers and the Internet become essential educational tools and technologies become more portable, affordable, effective and easy to use so too are they becoming increasing the focus on how they can be incorporated to support learning. These technologies provide many opportunities for widening participation and access to ICT. Mobile devices such as phones and PDAs are more reasonably priced than desktop computers, and therefore present a less expensive method of accessing a myriad of tools all in one small device. Feature such as the facility to make phone calls, take pictures, record audio and video, store data, music, and movies, and interact with the Internet all provide opportunities that could be harnessed in the educational context. As new devices continue to enter the market, new features and new capabilities are appearing at an accelerated pace. Mobile learning offers a fundamental change in the way learning can be regarded and opens the door to countless uses for educational purposes.

Kynäslahti (2003) highlighted three dimensions which mobile technology and in extension mobility offer to educators and learners:

- convenience
- expediency
- immediacy

In Seppälä and Alamäki (2003) these three elements of mobility were examined and compared to the feedback collected from a study conducted with trainee teachers using mobile devices in their teaching. In this study, the teachers enjoyed the convenience of mobile technology whereby they felt that mobile technology allowed them to better manage their time and use it more efficiently. For example, they could use the mobile devices on the bus or on the train where they could write notes or memos to be shared with other trainees. They could also upload pictures from the phone to the material bank. In terms of

expediency the trainees were able to access the Internet anywhere via the mobile device phone. For example they could use the mobile devices when they were at the shops to check if there was a particular foodstuff at school which was needed in a lesson on home economics. They were able to also integrate technologies whereby they could upload images straight from their mobile phones rather than waiting for them to return to class. Lastly, the trainee teachers felt that the greatest aspect that mobile technology offered was immediacy. With their devices they would able to do things immediately, for example, they made memos and took pictures while they were observing other trainee's lessons and were then able to share these with others.

Overall, how educators feel about using mobile technology will have a big impact on whether they integrate this new technology into their teaching. Given the critical role of educators, it is important to understand the contributions that educators make in supporting or inhibiting the integration of technology in the classroom. Although today's educators may be more familiar with technology in general, they still may not be fully prepared or able to integrate newer technologies, such as mobile technology, into their classrooms. This study looked at how educators view the integration of mobile technology and assess what benefits and drawbacks they see in its incorporation into the learning environment. In addition this study assessed whether attitude to technology and existing ability using computers played a role in the overall attitude to mobile technology integration within the teaching environment.

Literature review

Overall educators have significant power over how technology is used in their classroom and whether it is used at all. According to Abrami (2001) the reasons why educators do not incorporate technology into their teaching can be varied, however some aspects in particular relate to mobile technology incorporation:

- Educators feel ill at ease when using technology in the classroom and would be less likely to adopt a new form of technology [such as mobile technology]
- Educators may not feel enthusiastic about technology in general and therefore less likely to adopt newer [mobile] tools.
- Educators may not be using [mobile] technology to its potential as a cognitive tool due to teachers' lack of skill in using the technology or are unaware of its potential.

Individual beliefs play a significant role in the adoption of new Information and Communication Technology (ICT) (Dexter, Anderson, & Becker, 1999; Mercer & Fischer, 1992; Mishra & Koehler, 2006). Educators are the focus of interest because it is educators that have the primary contact with students and it is educators that experience the barriers and supports to integration of ICT first-hand (Mueller, Wood, Willoughby, Ross & Specht, 2008).

Research has shown that even if a educator's pedagogical beliefs and attitudes towards the integration and use of ICT in their teaching suggests that its integration would be positive to the learning experience, the teacher must believe that he or she is capable of implementing this tool successfully in order to act on those beliefs (Mueller et al., 2008). An educator that feels ill at ease when using ICT is typically the result of negative past experience, conversely an educator may feel at ease with ICT when they have had a positive personal experience using ICT and therefore research shows that they would be more willing to include it into their teaching (Becker, 1994; Hew and Brush, 2007; Rosen and Maguire, 1990; Wood et al., 2005). Changes in beliefs happen through personal experience, vicarious experiences and social–cultural influences (Ertmer, 2005). Therefore a positive experience may result in a more enthusiastic attitude to ICT use and therefore alter their beliefs and encourage more widespread ICT integration. Measurement of teachers' beliefs following ICT integration is necessary to identify lasting changes within the classroom.

A number of studies have has shown that if a person is more skilled in one medium, such as computers they would more likely adopt and use new mediums, such as mobile technology (Moos and Azevedo, 2009). In Caspi and Gorsky (2005) they showed that a person who uses elearning extensively was more likely to adopt new ways of using the other forms of ICT and therefore include a wider range of technologies in their teaching. Overall how educators perceive the use of in their teaching impacts on how frequently it is used.

However educator's attitude to ICT in general cannot account in total as to how they perceive mobile learning and whether or not they would integrate it in their teaching. Attitudes to mobile technology itself

need to be measured. Determining how teachers perceive mobile learning would provide good understanding of the possible future adoption of this technology.

A number of studies have been carried out looking at the key benefits that mobile technology offer educators (Rau, Gao and Wu, 2008; Markett, Sa´nchez, Weber, Tangney, 2006; Peters, 2007; Kukulska-Hulme and Traxler, 2005). In Kim, Mims, and Holmes (2006) these benefits have been summarised into four main groups:

- providing students [and educators] with freedom of location and time;
- increasing speed in teaching and learning;
- enabling one-to-one learning based on individual educational histories or test results; and
- allowing teachers to keep up the new educational subjects for future education.

These benefits all play a significant part in the adoption of mobile technology however in Naismith, Lonsdale, Vavoula, and Sharples (2005) they highlight a number of new challenges when adopting mobile technology in learning and teaching:

- Mobility – the 'anytime, anywhere' capabilities of mobile devices encourage learning experiences outside of a teacher-managed classroom environment. Inside the classroom, mobile devices provide students with the capabilities to link to activities in the outside world that do not correspond with either the teacher's agenda or the curriculum. Both scenarios present significant challenges to conventional teaching practices.
- Learning over time –learners will need effective tools to record, organise and reflect on their mobile learning experiences.
- Informality – the benefits of the informality of mobile devices may be lost if their use becomes widespread throughout formal education. Students may abandon their use of certain technologies if they perceive their social networks to be under attack.
- Ownership - both personal and group learning are most effectively supported when each student has access to a device. The ownership of the devices is thus a key consideration. According to Perry (2003), both tangible and intangible benefits can accrue through the use of mobile devices. Intangible benefits include a sense of belonging with the device and personal commitment and comfort. Ownership is stated as a prerequisite for engagement, where students have the potential to go "beyond the necessary and play with it to explore its potential". Personal ownership does, however, present a challenge to the institutional control of the technology.

Overall mobile learning is a relatively new technology and how it will impact on the educational environment will be underpinned on whether the instructor sees the possibilities that mobile technology has to offer education. The instructors experience, attitude and previous experiences will possibly all have a role in whether or not the adoption of mobile learning happens. The following section outlines the results of the survey undertaken to identify how these variables play a role in adoption and how educators currently perceive mobile learning.

Method

Participants

This survey comprised of a relatively small sample (n=42) of lecturers currently teaching in IT related disciplines around in New Zealand at a number of tertiary institutes. The survey was evenly dispersed between males (48%) and females (51%), with the majority of respondents falling in the 40 – 49 years (Mean=3.95, StdDev=1.1137) age category. All the respondents surveyed had a mobile device and the majority (89%) always carried the mobile devices with them.

Materials and procedure

Each participant was asked to complete one survey form. The survey comprised of three main sections the first focused on the educator's self reported comfort with using ICT, their enthusiasm with using ICT and how confident they were with using technology and how frequently they use a wide the range of ICT tools they use within their teaching. The second part of the survey gathering the respondent's level of agreement based on the perceived barriers and benefits of using mobile technology in teaching. This section also included questions relating to what kind of mobile learning activity they would most likely be interested in possibly integrating into their teaching in the future. The last section gathered demographic variables including participant's gender, age, and use of their mobile device.

Findings

The first part of the survey assessed respondents self reported beliefs in relation to how at ease, enthusiastic and confident they felt about using computers in their teaching and whether they used a wide variety of e-learning facilities in their teaching (such as discussion forums, Learning Management Systems, wikis, blogs etc). Respondents were asked to select their agreement or disagreement on a scale of 1 (strongly disagree) to 5 (strongly agree). As shown in figure 1 respondent overall felt at ease, enthusiastic and skilful with using ICT in their teaching. There was mixed opinion to whether they used a wide range of e-learning facilities in their class room with a fairly even split to those who did those who did not use a wide range of tools.

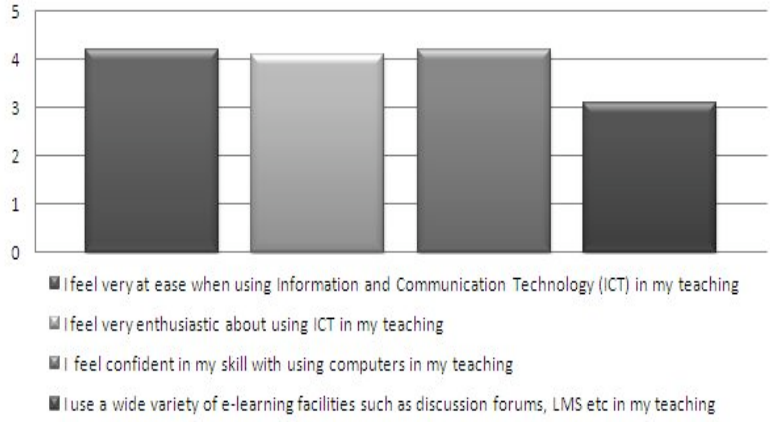

Figure 1: Computer experience and attitude to computers in education

The last question in this first part of the survey asked whether overall respondents were excited about using mobile devices in their teaching. The result of this showed a mixed response where on average the respondents did not strongly agree or disagree that they were excited about using mobile devices in their teaching (M=3, SD=1.1094). However when analysed further the results showed that those that were enthusiastic about using ICT in general in their teaching were more likely to feel enthusiastic about the adoption of mobile learning (Cronbach's alphas = .543). The results also showed that the lecturers that used a wide variety of e-learning facilities in their teaching were also more likely to adopt mobile learning in the future. This could be possibly be explained by the fact that many of the applications of ML learning are simply an expansion of e-learning i.e. Mobile blogs and mobile quizzes etc.

The study also showed that age was also possibly a factor in respondent's opinion to possibly using ML in teaching. As can be seen in figure 2 more mature respondents felt more positive to ML that their younger counterparts. However due to the relative small size of this sample and not enough representatives in all categories this would need to be further analysed in a larger sample.

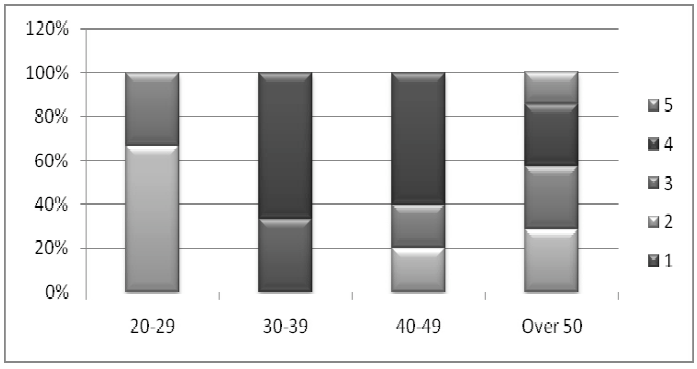

Figure 2: Enthusiasm about using mobile technology in my teaching and age

In terms of gender, there was no significant relationship with the future adoption of mobile learning and the differences between the genders.

Part two of the survey used the same scale as part one where participants were asked to rate agreement or disagreement on a 5-point likert scale. The statement related to a wide range of possible benefits and

barriers that may impact on the adoption on mobile learning by the respondents in their teaching. Figure 3 sets out a number of disadvantages which have been highlighted by other studies when considering the integration of mobile technology into the educational context. In this study respondents felt that time, cost and access seemed to be the biggest barriers to adoption whereas unfamiliarity and difficult to access information from the Internet was considered to be of a lesser barrier to the adoption of mobile learning.

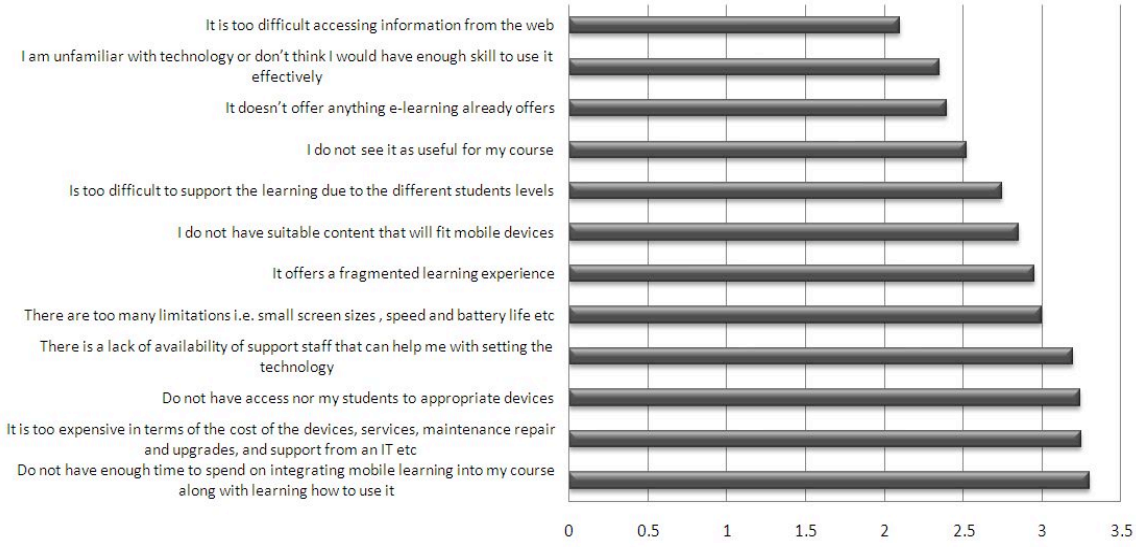

Figure 3: Possible barriers to mobile learning and participant's relative agreement

Figure 4 outlines the top benefits of mobile learning. Overall the main benefits highlighted by the respondents was that mobile technology enabled users to access real time information, and allowed freedom and flexibility and increased access to learning materials and online content. Conversely, respondents did not believe that all students all had equal access to this technology and that it provided more access to experts compared to e-learning.

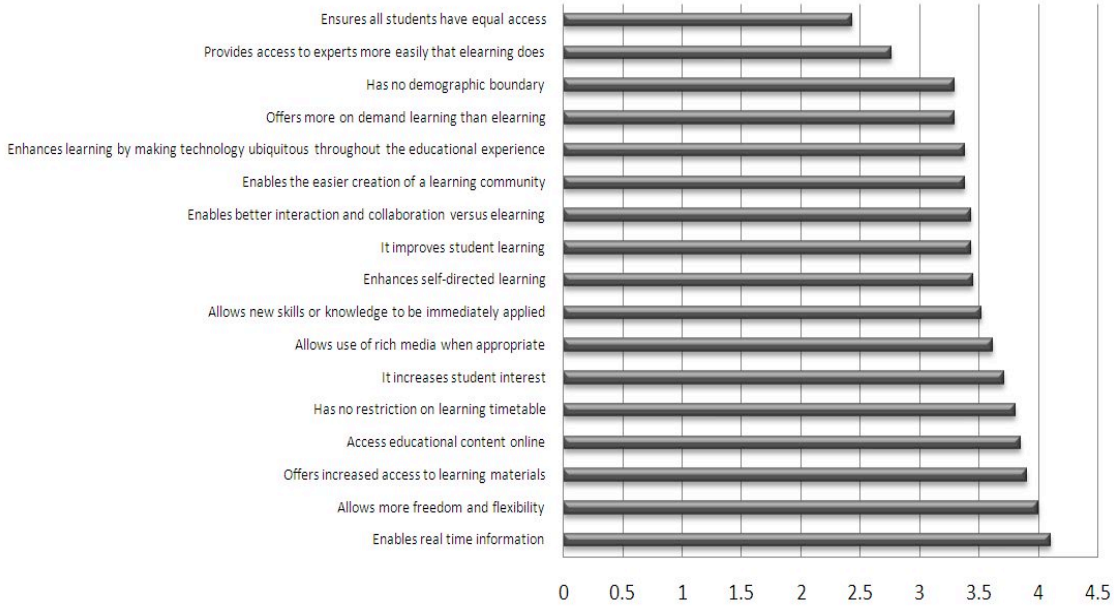

Figure 4. : Possible benefits to mobile learning and participant's relative agreement

The last part of the survey asked participants what application of mobile learning was they currently interested in integrating into their classes. As can be seen in figure 5, that the small scale integration of mobile tools such as SMS, mobile quizzes and blogging were more popular that larger more extensive integration. This result may be due to the fact that the small scale technologies would be more easily integrated and would at this stage be more likely to work with a wide range of devices and therefore be device independent.

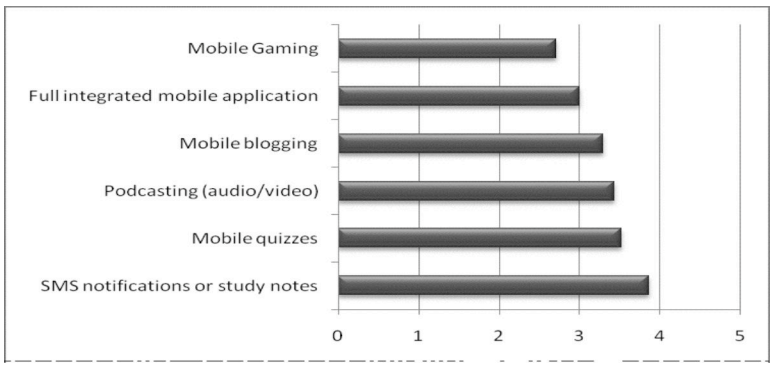

Figure 5: Interest in various applications of mobile applications

Conclusions and further study

Based on the results above, we can see that there are mixed feeling towards mobile learning in the tertiary sector. Educators see a wide range of possible benefits to the inclusion of mobile technology in their teaching. However the barriers to the inclusion of these technologies are still significant. Issues such as access to phones that support learning and the time needed to implement these technologies all play a significant role in the likelihood of mobile technology being accepted into the educational context.

Currently most interest in mobile learning tends to be towards the more simplistic integrations. Most educators are interested in relatively low level integration of mobile learning, such as SMS notifications and quizzes. This is possibly related to the perceived limitations of mobile learning and the fact that this technology is still in its infancy. However, with the ever increasing number of studies focusing on the use of mobile technology and the continual enhancement of mobile technology it is likely educators may feel more inclined to see mobile technology as a valuable tool to education in the future.

Overall, in this study we can see that the lecturer's perceived enthusiasm and previous experience in existing ICT tools will play a role in future integration of mobile technology. Therefore with the increased focus on mobile technology and the more advanced ICT technologies, enthusiasm and experience would likely increase. This finding is consistent with other research stating that there is a link between enthusiasm and experience when using ICT (Becker, 1994; Hew and Brush, 2007; Rosen and Maguire, 1990; Wood et al., 2005). Specifically, consistent with previous research, computer experience variables such as comfort with technology and higher frequency of use of computers were significant contributors to the use of new technology in teaching (Moos and Azevedo, 2009).

The findings of this survey offer a good initial insight to how instructors see mobile technology and the factors that will play a role in the adoption and integration of mobile technology in the educational context. However, these initial findings need to be further analysed in a more complete survey looking a wider audience of educators. The final outcome of this research is to develop a conceptual profile of how educators perceive mobile learning and what advantages and disadvantages they believe mobile technology brings to the educational environment. The factors of experience, motivation and existing ICT use will all be elaborated and assessed in future research to determine if these factors can legitimately be considered as indicators to educator's perception of mobile learning.

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Authors: Kathryn MacCallum, School of Information Technology and Computing, Eastern Institute of Technology Hawkes Bay. Email: kmaccallum@eit.ac.nz

Lynn Jeffrey, Dept of Management and International Business, Massey University, Albany

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