

MOBILE TECHNOLOGIES IN EDUCATION - UBIQUITOUS SCAFFOLDING AND SUPPORT FOR UNDERGRADUATE STUDENTS

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ABSTRACT

Abstract: The widespread use of mobile devices, particularly by young people, offers new and exciting possibilities for learning. The mobility and pervasiveness factors inherent to mobile technologies allow support for learning at any time and in any place. A common problem among young undergraduate students is that many are disinterested in learning. Often very little private study is done inside or outside of the classroom. This paper presents the findings of two research studies that show the affinity of young undergraduate students with their mobile devices, their openness to the possibility of using their mobile devices for educational purposes, their assessment of a mobile field study and their expectations of any effective future m-learning pedagogy. In addition an experimental design is proposed that facilitates the comparison of “mobile scaffolding” with other scaffolding techniques. Mobile scaffolding is a new research area which brings together the fields of traditional pedagogy with mobile learning.

KEYWORDS

Mobile Learning, Pedagogy, Scaffolding, Vygotsky, Zone of Proximal Development

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1. INTRODUCTION

A common problem among young undergraduate students is that many are unmotivated to learn. Many can be described as dependent learners relying on their educators to provide them with the enthusiasm and motivation needed as well as the learning materials (Fazey 2001). Often very little private study is done inside or outside of the classroom. The widespread use of mobile devices, particularly by young people, offers new and exciting possibilities for learning.

While mobile technology is still new and emergent, its application to teaching and learning has the potential to offer significant advantages (McManus 2002). Research evidence about m-learning can be found across most subject areas, and across all phases of education. Some of the key benefits identified by UK government research are the general student learning gains derived from increased enthusiasm, motivation, confidence and a sense of ownership (BECTA 2004). Other benefits of m-learning are the increased independence and self-initiated learning in students, and the extension of learning beyond the classroom. Ericsson's Leonardo Da Vinci Project 'Online' has shown that m-learning gives students more flexibility and choice in where and when they learn outside of the classroom (Ericsson 2006).

The mobility, ubiquity and pervasiveness factors inherent to mobile technologies allow learning at any time and in any place (Wood 2003). In order to harness these technologies for learning, effective pedagogical models for m-learning need to be explored and tested (McManus 2002). One such development is “mobile scaffolding” which brings together the fields of traditional pedagogy and mobile learning.

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The purpose of this paper is two-fold, firstly, to assess the affinity of young undergraduate students with their mobile devices, their openness to the possibility of using their mobile devices for educational purposes, their feedback for a mobile learning trial and their expectations of any effective future m-learning pedagogy. To this end two separate initial research studies are described and some of the findings of these studies are presented. Secondly, the paper seeks to address the question of whether the ubiquitous availability of scaffolding significantly improves learning by describing a research experiment that compares the effectiveness of different types of scaffolding.

2. INITIAL RESEARCH STUDIES

Two studies were conducted to explore students' preparedness for mobile learning using a survey and to assess the effect of mobile scaffolding on learning.

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2.1 Objectives

The objective of the first study was to look at the undergraduate students' attitudes towards mobile learning and their requirements for any future mobile learning systems. The study was based on a survey of students and their use of mobile devices. One thing that was highlighted by the survey was the extensive use of text messaging by students and their wish to receive administration information about the course by text message.

This lead on to the second study that involved a group of undergraduate students who volunteered to take part in an eight week study. For the eight week period the students were supported in their learning outside of the classroom by their lecturer via SMS text messaging. There were no extra marks for responding but the response rate per question from the students was on average over 40%. The results from both studies together with feedback gathered has come up with some very interesting findings which are presented in this paper.

2.2 Methodology

For the first study the data was collected from 37 participants who were all students on undergraduate University-level courses. A survey was presented to the students containing 43 questions covering topics such as their usage of mobile devices and their perceptions and expectations of mobile learning. The results of the survey showed that there was extensive usage of mobile devices amongst the group. The ownership of mobile devices was extremely high with 97% of the group owning a mobile device. Of this 97%, every member predominantly used a mobile phone as their primary mobile device. 29% of the group possessed more than one mobile device.

The high usage of text messaging among students, as identified by the first research study, lead on to the second study. This study involved 14 students from an undergraduate class who volunteered to take part in an eight week field study. The students were supported by their lecturer by occasional text messages and they are encouraged to respond if they wished. The messages were of three basic types, content-related messages (e.g., a small amount of learning material), motivational messages (e.g., encouragement), and administrative messages (e.g., assignment reminders or room changes). The students were also regularly sent short summaries of lectures and asked one or two short questions via text message after class. There were no extra marks for responding but the response rate per question from the students was on average over 40%. During the study the feedback from the students was recorded.

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2.2 Results

The results of the first study provided useful information on students' perceptions of m-learning. While m-learning is a new concept to most of the group, 75% of the group felt that the use of mobile devices to aid learning objectives would benefit their studies. Over half of the group said they were willing to use mobile devices to meet learning objectives and about the same number said they would upgrade their current mobile device to one that better supports mobile learning if they needed to. Nearly three-quarters felt that m-learning

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would be most beneficial when used in conjunction with existing course material rather than learning solely from a mobile device. When asked if they would consider using a mobile device to collaboratively work with other students on a task a large majority, 73% of participants replied that they would. Over half of the group were willing to use a mobile device to meet a learning objective and would upgrade their current mobile device to one that better supports mobile learning if they needed to. Moreover, SMS text messaging was identified by the study as a very highly used function by undergraduate students. 30% of the group also reported that they send over 50 text messages a week. Over 90% of these text messages sent each week were used for social reasons with less than 10% being sent for course-related reasons.

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The second study produced some interesting feedback from the students. Some of the advantages of receiving support via text messaging, as identified by the students, were:

- Very useful to inform students of class changes or cancellations – this would be beneficial to both students and teachers no matter how big or small the class size.
- It makes the lecturer more accessible and approachable, therefore easier for students to ask for help if they are struggling or seeking clarification on topics already covered.
- Good to advise students of topics to be covered in upcoming lectures.
- Could be used to summarise lectures or note important points to remember.
- Helps consolidate knowledge by asking questions to get students thinking about what they have just learned and remember it.
- Helps to motivate students and remind them of assignments/homework to be done.
- Useful to recommend extra reading or websites for further information.
- Builds rapport between lecturers and students.

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In summary, the results of the two initial studies indicate that students are well disposed to the idea of receiving support from their lecturer outside the classroom via their mobile devices.

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3. MOBILE SCAFFOLDING

Encouraged by these preliminary results, we aim to explore the concept of mobile scaffolding and whether or not it leads to improved learning. The term 'scaffolding' was developed to describe the type of support offered by a teacher or peer to support a student's learning. During scaffolding the teacher helps the student master a task or concept that the student is initially unable to master on their own. The teacher only offers support with tasks or concepts that are beyond the student's capability. This is the Zone of Proximal Development (ZPD) as described by Vygotsky (Vygotsky 1978). Vygotsky believed that when a student is at the ZPD for a task or concept, providing the appropriate scaffolding will give the student enough of a "boost" to achieve the task (Galloway 2001). It is very important to allow the student to complete as much of the task as possible, unassisted (Lipscomp et al 2004). Once the student has mastered the task or concept the scaffolding is removed and the student will then be able to complete the task on their own.

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Mobile scaffolding is the provision of this type of support via mobile communication. The student receives the support through their mobile device from a More Knowledgeable Other (MKO) (Lipscomp et al 2004). The MKO refers to someone who has a better understanding than the learner, with respect to a particular task or concept. Although the MKO is usually a teacher or tutor, it could also be the student's peers who provide the assistance in terms of their superior knowledge or experience, or it could even be an agent such as an Intelligent tutoring systems (ITS) (Galloway 2001). The personal ownership of mobile devices makes them ideal for delivering the individualised instruction to the learners. It is unlikely that mobile scaffolding will be used in isolation from other types of scaffolding (e.g. classroom instruction) and therefore it is difficult to assess its effectiveness in isolation. One of the ways it can be studied is by comparing its effectiveness to other types of scaffolding (or their absence).

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4. MOBILE SCAFFOLDING EXPERIMENT

To compare the effectiveness of different types of scaffolding a research experiment is described. The scaffolding is conducted in addition to classroom-based instruction. A group of undergraduate students doing

a particular module (e.g. Data Communications) who volunteer to participate in the experiment will be divided at random into three groups of roughly equal size, group A, B and C. Next, each participant will be surveyed to ascertain their prior knowledge of the module and initial feeling and attitudes towards the experiment. This survey will reveal the level of understanding the students are currently at and thus will reveal the lower entry point to their ZPD. Those in group A (the control group) will receive no extra scaffolding. Those in group B will receive regular messages from their lecturer regarding the module content and will be able to access information about some of the concepts covered in the module. The messages will be sent via email. Those in Group C will receive the same messages and should be able to access the same information through their mobile device. Any replies by the students to the messages will be recorded and a scaffolding dialogue may begin. In this way the scaffolding may be implemented. At the end of the scaffolding period, approximately 10 weeks, a final survey will be conducted to ascertain how much each participant has learnt due to the scaffolding during the period. The results of the survey should provide valuable insights into the effectiveness of the mobile scaffolding as compared with the email scaffolding and the case where no extra scaffolding outside the classroom is provided. An additional survey of the scaffolded participants will reveal their attitudes towards and experiences with the different types of scaffolding and could cast light on the usage patterns of the learner.

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5. CONCLUSION

In this paper two research studies in m-learning have been outlined and some of the results have been presented. The first study shows the extensive use of mobile devices amongst students and the fact that very many are willing to use their mobile device to meet a learning objective. The second study demonstrates how the use of text messaging to support students can have significant advantages. The potential for mobile technologies in education is enormous and these research studies provide a valuable input into the creation of an effective pedagogy for m-learning, of which mobile scaffolding is a key component.

In addition to the two research studies a research experiment in mobile scaffolding is described. One issue here is that most students' mobile devices are relatively slow and do not support multimedia. Until such time as they do, it will be difficult to implement the mobile scaffolding described as the students will be unable to access the course content via their devices. In time this issue should be resolved and the results of this experiment could provide valuable insights into whether the ubiquitous availability of scaffolding significantly improves learning.

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REFERENCES

- BECTA 2003, What the research says about network technologies in teaching and learning, The British Educational Communications and Technology Agency 2003, <<http://www.becta.org.uk/research/display.cfm?section=1>>
- Ericsson 2006, Mobile Learning: The Next Generation Of Learning, Leonardo Da Vinci Project Online, Ericsson Education, <http://learning.ericsson.net/mlearning2/index.shtml>
- Fazey D.M. and Fazey J.A., 2001, The Potential for Autonomy in Learning: perceptions of competence, motivation and locus of control in first-year undergraduate students, *In Studies in Higher Education*, Vol. 26, No. 3, pp345-361
- Galloway C. A., 2001, Vygotsky's learning theory. In M. Orey (Ed.), *Emerging perspectives on learning, teaching, and technology*. Available Website: <http://www.coe.uga.edu/epltt/vygotskyconstructionism.htm>
- McManus T., 2002. Mobile what? The educational potential of mobile technologies, *Proceedings of World Conference on E-Learning in Corp., Govt., Health., & Higher Ed. 2002*, pp 1895-1898.
- Lipscomb L., Swanson J., and West A., 2004, Scaffolding. In M. Orey (Ed.), *Emerging perspectives on learning, teaching, and technology*. Available Website: <http://www.coe.uga.edu/epltt/scaffolding.htm>
- Wood K. (2003) Introduction to Mobile Learning (M Learning), FERL – Technology for E-Learning, BECTA ICT Research, March 2003
- Vygotsky L.S., 1978, *Mind in Society*, Harvard University Press. Cambridge MA., USA

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