USING MOBILE PHONES TO PREPARE FOR UNIVERSITY LECTURES: STUDENT'S EXPERIENCES

Marit Rismark, Astrid M. Sølvberg, Alex Strømme, Leif Martin Hokstad
Norwegian University of Science and Technology
marit.rismark@svt.ntnu.no, astrid.solvberg@svt.ntnu.no, alex.stromme@bio.ntnu.no, leif.hokstad@svt.ntnu.no

ABSTRACT
In this paper we present findings from a study of students' use of mobile phones in a biology course at the Norwegian University of Science and Technology (NTNU). Using a qualitative research approach we focus on how mobile phones can complement and add value to the educational challenge of encouraging university students to obtain some topic knowledge prior to their lectures. In the course material short video-recorded highlights of upcoming lectures were available on the university's learning management system (LMS). The students used WLAN / 3G mobile phones or PCs to view the videos. All in all, the participants were excited about the new learning opportunities in the course and the findings suggest that the use of videos and mobile phones contributes positively to student learning activities.

Keywords: Higher Education, Innovative Pedagogy, Learning Management System, M-learning, Virtual Learning Environment.

INTRODUCTION

In higher education we find a growing awareness of the need to develop teaching approaches to facilitate student learning. In the debates on teaching and learning methods at the university level in Norway, there is a concern about what is lost when students come unprepared to lectures. Thus, there is an interest to develop effective means to encourage students to prepare themselves for upcoming lectures. In educational literature, an underlying assumption is the belief that preparations prior to lectures may be a highly effective means of awakening student interest, increasing student involvement during lectures and thus improving their learning outcomes. Research findings also suggest that students who have some 'prior knowledge' learn more effectively than unprepared students (Alexander et.al. 1997; Alexander & Jetton, 2000). For example, students' prior knowledge about the topic of a text is found to contribute to their comprehension (Samuelsstuen & Bråten, 2005).

Use of technology in education may represent new opportunities for students to gain prior knowledge ahead of lectures. Many authors have argued that there is reason to believe that wireless portable technology will have a role to play, at a general level, in the way we learn (e.g Patten, Sanchez & Tangney, 2006). A definition of m-learning is "the provision of education and training on PDAs/palmtops/handhelds, smartphones and mobile phones" (Keegan 2005, p. 3). The concept envisions how students continually are on the move, always in a position to interact with fellow students, teachers, subject matter and various technologies. In this way m-learning combines individualized learning with anytime and anywhere learning (Quinn, 2001). Despite the tremendous growth and potential of wireless phones and handheld devices (W/H devices), wireless e-learning and m-learning are still in their infancy. There is little knowledge on how to tap the learning potential that is embedded in the latest mobile technologies.

Bearing this in mind, an interdisciplinary research and development project was launched. The project developed multimedia content, technology and educational designs that can support student learning processes in general and their preparations prior to lectures in particular. In this paper we discuss how the use of mobile phones may encourage students to gain some prior knowledge about subject matters ahead of lectures. Students enrolled in a biology course at Norwegian University of Science and Technology (NTNU) used mobile phones to access course material that was made available through the university's learning management system (LMS). The project is based on an overall understanding that learning on W/H devices will never replace classroom learning activities. Rather, our project explores how mobile technology can complement and add value to the current learning practices.

Method and arrangements

The Norwegian university of Science and Technology, located in Trondheim, has a long tradition of positioning itself at the technological cutting edge (www.ntnu.no). Virtually all students in Norway have private computers. Both students and staff have wireless broadband access at the indoor and outdoor campus areas.

Participants

Throughout the fall term of 2006 we studied seven students (one male, six female) enrolled in a biology course (histology) at NTNU. The students had studied biology for the same amount of time and were therefore considered to be an academically homogenous group. The group members, who on average were just under 24 years of age, were relatively skilled users of technology. Mobile telephones were already an integrated part of their social life, and they were frequent users of laptops or stationary computers both at home and on campus.
All the biology students had mobile phones with WLAN / 3G (Nokia N80) at their disposal during the course. They could use the mobile phones to access course material that was made available thorough the university's LMS. Using the LMS was already an integrated part of their study habits. The university expects students and the faculty to use LMS in their work on the subject. However, using the mobile phone to access the LMS was new to all students.

Subject matter
The subject matter in the biology course was histology (mammal tissue knowledge). The content is descriptive and does not require a high degree of synthesis and reflection. Nonetheless, there is much textbook material that must be recognized, remembered and systematized. Latin and Greek terms are used extensively and must be learned along with the terms in English and Norwegian. Visual studies of pictures and specimens are essential in this subject. The candidates are presented figures or pictures and microscope specimens, where they must explain the cell types that may be distinguished and their function in mammal tissues. Thus students must generally acquire factual knowledge and apply this in reasoning that is either correct or wrong.

Lectures and lab exercises were the basic components of the teaching. The lectures were traditional in the sense that the professor reviewed the day's topic, and also used visual aids such as pictures, film, figures and physical models. The lectures were followed by lab work where the students examined specimens under microscopes in connection with the topic of the day. The students also had to solve assignments posted on the LMS, and also had access to video footage for each lesson.

Designing videos
In the course material short video-recorded highlights (four to six minutes) of upcoming lectures were available on the university's learning management system, usually one day prior the lecture. In the video, the professor presented main themes and pointed at some key elements the students should look into prior to the next lecture.
The professor prepared the introduction video together with the university multimedia centre. In the videos the professor talked about selected topics using slides, while text and graphics, were gradually introduced in a Power-Point presentation. The video productions were recorded in a studio. The professor was seated in front of a lighted green screen, and using a technique called keying, the finished video appeared to show the professor in front of the various PP slides (http://en.wikipedia.org/wiki/Greenscreen). The result is was a composite picture that showed the professor in the foreground and the PowerPoint slides in the background.

A technician controlled the various PowerPoint slides the professor had prepared in advance from a control room, and these were displayed together with the video picture of the professor on three TV monitors facing the professor in the studio. The professor saw the composite picture live on these TV monitors, thus orienting his placement in relation to the text and images in the PowerPoint slides. The recording was done in the control room, and converted to file formats for Internet display (.wmv) and mobile phone (.3GP) immediately afterwards.

The videos were digitally processed and posted on the LMS in three versions. One for PCs and two for mobile phones adapted to different bandwidths. Usability tests were conducted at the onset and half way through the project to test the mobile versions of the learning material, and the technology was adjusted accordingly. Three pilot videos were developed and tested and adjustments were made to colour, fonts and video length.

Technical arrangements
In collaboration with the developer of “it’s learning” (www.itsolutions.no), the LMS used at NTNU, a version for mobile phones was developed. The LMS supplier adjusted the system according to the needs defined by the project group. After some initial technical problems, most LMS functions could be accessed in the mobile version and suitable telephone models could display most of the LMS functions.

The professor initially developed the LMS content on a PC. Then the content was reformatted to mobile phone use. This was done automatically with no need for special adaptation. The students were able to choose whether they wished to receive information, solve assignments or view the videos on either a PC or mobile phone.

A qualitative research approach to capture the students' experiences

A qualitative research approach allowed us to explore in depth how the use of mobile phones supported student learning activities. To collect data about how the students used mobile technology in their preparations for upcoming lectures, we combined observations and interviews. One main concern was to explore student experiences with the videos.

Observation of behaviour in a natural setting gives us the opportunity to develop insight into social phenomena (Silverman, 2002). Attending lectures gave us first-hand information about how the instruction was carried out and allowed us to explore how the video material was incorporated into the lecture. Altogether we observed 11 lectures (each of 45 minutes) in the histology course in the autumn of 2006. However, observation alone did not give us insight into what each student believed and thought about the programme in question. To gain a holistic understanding of the context it is necessary to gain insight into the experiences of the actors, and the reflections underlying the observed behaviour and actions (Patton, 1990). We therefore also conducted interviews with the students, which were held immediately after the lectures. We also carried out interviews (30-45 minutes) with each student toward the end of the semester. These interviews were based on the previous observations and enabled us to elaborate and clarify situations we had experienced together. Such a joint reference framework helped make our analyses more reliable when it came to the reality we wanted to describe. When the intention is to ascertain participant experiences, first-hand experience with how such media function is essential (Hine, 2000). Therefore, researchers, the professor and the students used the same mobile technology throughout the project period.

The data analysis is inspired by grounded theory, in that categories have been developed in order to identify that which is "significant to the respondents" (Strauss & Corbin, 1998). The categories that we developed were grounded in data and came about through an interplay between the researchers, transcribed data material and theory, and was undertaken both in the field and after the data were collected. Throughout the analysis, a theoretical assumption has been that learning comes about in the interaction between the students, the professor, subject matter and the technology used. The analysis has been inspired by how the students experience these interchanges and what it means to their learning opportunities.

FINDINGS AND DISCUSSION

All in all, the students were excited about the new learning opportunities in the course and the findings suggest that the use of mobile phones contributed positively to student learning activities. The mobile phones introduced new opportunities for learning. The observations and interviews show that the students now prepared before lectures and that they used the videos for this. All students had used the mobile phone to watch the videos. Some students used it on a regular basis while others did not. Students claimed that watching the video before attending the lecture raised their awareness of upcoming issues and may have contributed to active participation during lectures. The new arrangements also allowed for flexibility about when and where to prepare for lectures.
In the analysis we developed three categories about the uses of the mobile phone as a support to learning. It was evident that the mobile phone enabled the students to prepare for lectures in different ways. Firstly, the students used the mobile phone to view the videos without further preparation, that is, as a way of orienting themselves in the coming topic. Secondly, the students used the mobile phone to watch the videos before they read the subject material proposed by the professor and the tasks he assigned. Thirdly, the students used the mobile phone to keep updated on news that was on the LMS.

Using the mobile phone to get an outline of the upcoming lecture

Sometimes, students used the mobile phone to view the videos ahead of lectures without further preparation. The mobile phone thus worked as a preparation tool for the purpose to familiarize themselves with the topic without using other study material. The students would often claim that lack of time was a factor in the cases where they used their mobile phone in this way. They could view the video over breakfast, on the bus or during breaks between classes. One student tells about what it means to be able to use the mobile phone in this way:

"I'm really bad at working on the material beforehand, so I think it's really good that we get these videos, if not I wouldn't have done more ... [...] ... so I view the video immediately before (the lecture) ... especially on Mondays because then I have a lecture from eight to ten, then the histology class starts at ten fifteen, and I usually forget to do it on Sundays, but then I only need to view the video." (Int.5:1)

Evidently, the mobile phone represented new opportunities to create time and find the opportunity to prepare. The utterance above confirms the basic assumption of this paper, which is that students do not habitually prepare for lectures. Furthermore it is illustrated that the mobile phone allows for last minute preparations. In actual fact this means the difference between preparing and not preparing at all.

These findings about the learning benefits from preparing ahead of lectures may thus add to debates about educational use of mobile technologies Although the students used the mobile phone to watch videos without further preparations, it is reason to believe that they come to the lecture with some prior knowledge about the topic. More specifically, watching the videos provides familiarity with some concepts and some general outline of the coming lecture. This was described as a being alerted and put in a state where they are ready to learn by "being brought into the modus of histology".

Using the mobile phone for more extensive preparations prior to lectures
Sometimes students used the mobile phone to do more extensive preparations prior to lectures. One main impression is that when the students were doing their preparation activities, they spent time on this work. They used a plethora of learning aids and information sources. The textbook, other books, the Internet, dictionaries and other reference works were used to prepare for the lectures. This was precisely the type of student activity the professor wished to facilitate with the video.

The students stated that they complied with the professor's instructions on the video. When they were performing preparation activities they also used the Internet or other sources of information:
"...he'll give some tasks, then I do the tasks, and then I'll read parts of the book and read the introduction to various chapters ... [...] ... and then occasionally I need to look up things in an encyclopaedia or something on the Internet." (Int. 3: 1-2).

In the data material we also see that the students had various opinions about weather the mobile phones where the appropriate technology to use for extensive preparations. All students stated that they had used their mobile phone to view the provided video followed by other preparation activities. However, one student did not see how the mobile phone could support preparations, since other learning materials were needed anyway. Along with this person's study habits, all preparations took place at the university within working hours at a desk with PC and books. This approach is contrasted by the following utterance:

"I found it smart to use it (the mobile phone) in the reading room, ...[...]... because I didn't have a laptop there, so it has useful to watch the video and do the exercises there, where I have the books in the reading room." (Int.3: 4)

In this utterance, the student appraises the mobile phone's handiness in accordance with other learning materials. Thus, the argument about the need for other learning material during extensive preparations is used both to reject and to include the mobile phone. This implies that the mobile phone is incorporated or rejected in accordance with the already established study habits.

Using the mobile phone for updates on the LMS
The new arrangements enabled students to connect to the LMS by mobile phone. Besides watching the videos, the students used the mobile phones for general updates about the latest news related to the subject. The students praised the opportunity to keep updated at any time and any place. Being able to connect to the LMS by mobile phone brought about new opportunities. The interview material reveals that the technology enabled the students to keep informed about subject related matters of a more general kind:

"... and then it's really good to be able to check with "It's learning" (the LMS) whenever you want, check whether there's something new ...[...]... to see whether new messages have arrived on "It's learning", or mail, then it's really useful to have this option available, that you don't need a PC to, well, check mail or whether there are new exercises, and watch the video..." (Int.3: 4&8)

The mobile phone was used continually to log on to the learning platform to keep updated about changes and news. The students evidently valued this new possibility. It offered flexibility regarding time, place and which technical device to use. This third way of using the mobile phone during the biology course provided yet another learning supportive opportunity.

CONCLUSION
It is argued that it is reason to believe that wireless portable technology will have a role to play in the way we learn (e.g. Patten, Sanchez & Tangney, 2006). The technology and course arrangements in our project show three ways that technology may affect study habits and the way students learn. Students could do extended or limited preparations when they watched videos ahead of lectures. Besides, they could catch up with general updates about the subject. In this way the technical arrangements went along with students' needs and the

educational considerations in the learning arrangements. Thus the arrangements allowed for students to put diverse efforts into preparations by means of three approaches to gain prior knowledge.

The students used the mobile phones for three purposes during preparations. This touches upon the role of LMS in teaching and learning in higher education. LMS provides the platform for web-based learning environments by enabling management, delivery and tracking of learning. Our findings suggest that LMS may exceed these functions. When students used the mobile phone to get an outline about the upcoming lecture, and for more extensive preparations prior to lectures, the LMS functioned as a learning tool. When the students used the mobile phone for updates within the subject, the management aspect of the LMS came into use.

As a result of this study we can say that affordance of constant access to LMS by mobile phones may represent new learning opportunities in higher education. One key issue is that the use of technology must be driven by pedagogical rather than technical reasons. Our findings about using the mobile phone to get an outline of the upcoming lecture, for more extensive preparations and for updates on the LMS, come about in a context with a balanced interrelationship between student, subject matter and the technology used.

AUTHOR NOTE

The two first authors, Rismark and Sølvberg, have contributed equally to the development of the ideas that are developed throughout the paper. They have designed the research study, collected and analyzed the data material, and written the main parts of the paper. The third author, Strømme, has developed the videos and provided text that describes the biology course and the procedures for producing the videos. He has also commented on drafts as the paper developed. The fourth author, Hokstad, has brought the project group together, conducted usability tests and commented on the final draft of this paper. We thank our cooperating partners Torleif Hallén and Martin Gaustad, both at the NTNU Multimedia centre, for their technical contributions throughout the project.

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