

MOBILE DELIVERY AND THE DISTANCE LEARNER EXPERIENCE

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ABSTRACT

This research at Athabasca University dealt with improving access to distance learning material using mobile devices, then determining how learners perceived these enhancements to online learning. During the course of the research, students were directed to access their web-based course materials using their mobile devices, then asked to complete a survey regarding their perception of this experience. As the courses were all online, independent study, distance learning courses, there was no obligation to respond, however about 96 students replied to the survey. This paper addresses the methodology of delivery to multiple devices and explores the responses of students who completed the survey after trying out the course access using their own mobile devices.

INTRODUCTION

Education is now being transformed by the use of wireless mobile technologies for mobile learning (M-Learning) (Kassop, 2003). As the number of mobile device users is growing exponentially, the School of Computing and Information Systems (SCIS) at Athabasca University determined that it was an opportune time to determine what students taking computing science courses online required in terms of mobile access. At the start of the study, SCIS had a limited capability of delivering the course study guides and accompanying distance learning materials to a variety of mobile devices. There was work needed to improve the device detection scheme and to improve the delivery of the course

materials to a mobile access. Once this work was done, the researchers then surveyed the user regarding their experience with access, how useful they found the mobile access to be, their views on the added flexibility, and what type of future use they would likely wish to see.

This research was done through two continuing projects, using the same groups of students. This research has confirmed the need for mobile delivery of course materials to students throughout the university. Athabasca University has been increasingly recognizing the requirement to deliver to the mobile learner. Because Athabasca University is a distance education organization, there is great importance in research and analysis of teaching and learning in a mobile environment. This need was emphasized in the Athabasca University Business Plan which states “Nurturing creative experimentation in networked research communities and mobilizing knowledge in a digital environment has the potential to transform the way we think about scholarly resources” (Athabasca University, 2006). This is consistent with the strategic direction of the University in the area of enhancing open access which ensures that education is available to students anywhere and anytime, and recognizes that the workforce is increasingly more mobile. One of the objectives under this goal was to ensure student retention through the provision of dynamic services to meet their diverse needs (Athabasca University, 2005).

RELATED RESEARCH

As learning and training goes global, M-Learning is the first stage in the creation of a global provision of training on the wireless Internet (Keegan, 2002). It sets in place the first building block for the next generation of learning, which is the movement from distance learning (D-Learning) and electronic learning (E-Learning) to mobile learning (M-Learning). However, M-Learning happens in the context in which it is needed and relevant and is situated within the active cognitive processes of individuals and groups of learners. As a result, learning is more relevant and effective with M-Learning (Brown, 1989). Ring (2001) conducted a study to determine the effectiveness of a course delivered by wireless phone technology. Results indicated that 93% of students having wireless access reported that the technology made the course more convenient and they could work from anywhere. Students also reported that they were able to access the course while traveling in a taxi or waiting for a bus. The wireless technology gave freedom to access the course from anywhere and students were able to get an overall feel for the content in the course.

In the studies done by Ally and Stauffer (2008), the researchers explored the potential of mobile learning in terms of mobile devices used by students and the applications required to deliver to these devices. The development of technology used in the pedagogical approaches to learning with mobile devices resulted in the determination that further research was required for advancement of the delivery methods. One aspect determined from this outcome was the need to resolve and test more robust methods of device detection and stylesheet delivery. Another was a need to review the course materials and determine which were not suitable for mobile delivery, and if so, what methods of adaptation through device detection and style sheets could be offered. The purpose of this study was to determine the devices being used by students, what they were accessing on the SCIS site using mobile devices, their experience with that access, and how useful they thought the mobile devices were to access course materials (Ally and Stauffer, 2008).

The research of McGreal, R. et al (2005) identified in its report some of the technical difficulties in delivering to mobile devices. This project compared two different operating systems and their browsers, the Pocket PC and the Palm Pilot and identified several problems in delivering a generic style sheet to these two different systems including inconsistency in display of the content (McGreal, Cheung, Tin, Schafer, 2005).

The SCIS course materials are developed in XML format using the IMS Learning Design specification. As a result, not only is the content separated from the presentation, it also identifies specific activities and learning objects within each unit of learning. This allows the opportunity to display the content in many different formats, in a wide range of layouts, and on a variety of devices. Device detection is done at the presentation level, and depending on the device detected, the stylesheet is selected that best matches the device (Stauffer, 2005).

In the first part of the study, severe limitations in the device detection method were discovered. It involved a simple device detection JSP page as demonstrated below:

```
String user_agent = request.getHeader("user-agent");
if ((user_agent.equals.....
    mobile=true;
```

This code then required a set of referenced User Agent strings (Ally and Stauffer, 2008). While this worked adequately, it did not provide a robust method of device detection as new user agents appear on the mobile device market on an almost daily basis. One alternative that could be employed to improve on this method of delivery involved the

Device Database API (Fling, 2006). While this method was explored, it was rejected because the database still requires the constant updates for current devices. The scheme that was finally implemented was by detection of screen size. As described by Bowman (2004), the solution was to use JavaScript to detect a browser width equal to or greater than 800 pixels, which determines that the stylesheet is be delivered to a desktop browser. Otherwise, it is assumed that a smaller screen is being used and a stylesheet specific to a mobile device is delivered. This is an inverse solution to the problem, but it resolves the issue that many mobile devices do not recognize JavaScript (Bowman, 2004).

Following the recommendations of the W3C Mobile Best Practices Document regarding presentation issues, the content for mobile devices had to be arranged to best suit the size of the screen, the input devices, the bandwidth and cost, and the goals of the user (W3C, 2006). During the research study, all of the course materials used in the SCIS study guides were identified and tested on the mobile devices. Not only was the stylesheet adjusted for the mobile screen, but various multimedia files were tested and alternate methodologies for materials that mobile devices are not capable of viewing were implemented.

W3C Best Practices (W3C, 2006), suggest that testing should be performed on a wide range of devices due to variations between mobile browsers. In this case, the project carried out testing on the actual devices as with students providing feedback on the devices they were using. The variety of devices used by students included iPaq devices, PalmOne Treos and Tungstens, Blackberries, Dell Axims, Pantech 3200s, Motorola Razors, Samsubs, UT Starcoms, a Toshiba Pocket PC e330, and even a PSP (Portable Sony Playstation). The researchers used Palm Treos, a Samsung, a Dell Axim, and an iPAQ device. There was a complete range of connection plans including WiFi, phone plans, and desktop synchronization used by both students and researchers.

METHODOLOGY

The final (and most important) aspect of both research studies was to explore the students' perception of these offerings and determine if the improvements to mobile delivery are meeting the needs of students using mobile devices. The target group was comprised of about 1200 students taking a variety of online computer science courses. These students were selected because they all use online course materials for their studies and were currently active in the courses at the time of the research. Since undergraduate courses at Athabasca University are individualized study courses, the option to access their course materials using any mobile device was entirely up to the student to do at their own

pace. The students all access their course materials online and from a distance, and are at different places in the course at any time. (They are non-paced with start dates occurring every month and course durations of up to 6 months.) The request to try to access a unit of study was completely optional, as was the request to fill out the survey form. However, it was hoped that at least 10% of these student would respond. At the end of the studies, a total of 96 students had completed the survey. The web server access logs were reviewed frequently and showed that there were approximately 100 hits a day on the mobile device-specific files.

The purpose of the surveys was to determine the devices being used by students, what they are accessing on the SCIS site using mobile devices, their experience with that access, and how useful they thought using mobile devices to access course materials was.

In a research study conducted by ASTD and The MASIE Center (“If We Build It, Will They Come?”), the conclusion was drawn that while technologies can increase the efficiency and convenience of delivering courses to students, the assumption cannot be made that there will be satisfaction or acceptance of the technology on the students’ side (ASTD and The MASIE Center, 2001). Robertson (2007) determined that even though mobile technologies are now extremely popular, the assumption that this would lead to a preference for their use with online learning has not yet been well-tested.

RESULTS

The initial questions of the surveys involved the type of device, their connection plans, the pages accessed, the typical number of times the students used their mobile devices to browse the Internet, and a description of any problems encountered accessing the SCIS course materials. The first set of surveys gave qualitative answers, while the second set had mostly quantitative results. The devices and connection plans have been briefly summarized earlier. Students chose a unit of learning in their study guides and reported a large variety of related web sites visited on their devices. There were no critical errors in access. While some students needed to make some minor adjustments to their settings, all students were able to access the SCIS course materials web pages using their mobile devices.

The remaining questions of the survey are examined in more detail below:

Statement 1: It is very useful having access to course materials from a mobile device.

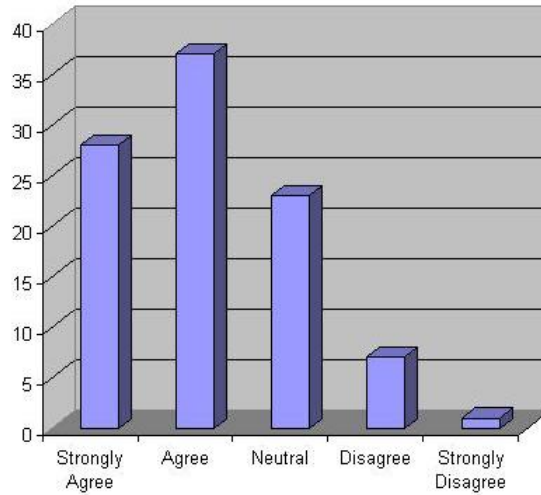


Figure 1. Response to Statement 1 by Percentage(%)

The majority of students either strongly agrees or agrees that it is useful to be able to access course materials with mobile devices. The types of comments provided by students included the readability of the screen, the straightforward navigation and layout, and the fact that this type of access opened up new possibilities in online studying.

Statement 2: Using a mobile device to access course materials increases convenience and flexibility in taking courses by distance learning.

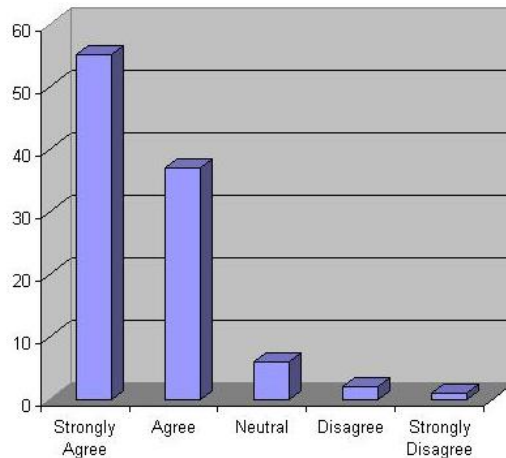


Figure 2. Response to Statement 2 by Percentage (%)

The majority of students said that they strongly agree that the use of mobile devices provides convenience and flexibility in taking courses by distance learning. Some

comments provided by students to reinforce this outcome included the ability to take the course anywhere and the constructive use of waiting times.

Statement 3: I would ideally like the following scenario for taking online courses:

Scenario Preferred	Percentage (%)
Mostly using a desktop or laptop computer with some use of a mobile device	85
Using a desktop or laptop computer exclusively	12
Mostly using a mobile device with some use of desktop or laptop computer	2.5
Using a mobile device exclusively	0

Table 1. Response to Statement 3

Statement 4: Besides the course study guides, I would like to see any of the following available for access by mobile delivery

Access Preferred	Percentage (%)
Access to Online Assignments	63
Login to courses and study materials	55
Peer-to-peer interaction	45
Course Forums	45
Access to Quizzes	45
Access to Helpdesk	40
Group interaction sites (such as facebook.com)	30

Table 2. Response to Statement 4

Some comments from the survey responders:

- “I couldn't imagine doing any amount of typing on a hand held device, or any activities that require a larger screen to get the bigger picture.”
- “Thanks for opening my eyes to this possibility - I'm going to enjoy my secret productive weapon for those dead times in my day. My compliments to the excellent formatting job you have done on the course notes. “
- “I think it is a good idea that you are beginning to get with the new age and letting us students access the courses through our mobile devices“
- “I like the idea of working through the on line material using the handheld device....I don't find my handheld is particularly convenient for any type of data input.”
- “Still doesn't replace a laptop in my opinion but useful when it's not available. Great for sitting at Starbucks or airport!”

DISCUSSION

While the majority of students responded that they either agreed or strongly agreed that the use of the mobile device to access the course materials was useful and provided both flexibility and convenience, most users stated they would mainly use a desktop for their courses though, with occasional use of the mobile device. This was also reflected in the comments as the size of the screen, the difficulty in typing, the cost of web access, and the quality of the screen output are all impediments to constant use of a mobile device. However, the convenience of being able to take the course work along to wherever the students were, and whenever they were able to access their course work was of significant value, as noted in both the comments and the statement numbers. The smaller number of users who did not find the mobile device useful identified the same impediments to mobile device usage for course materials access.

There were a few limitations in the outcome of this study. There was no information gathered regarding the demographics of the users. At Athabasca University, undergraduate students all study independently at a distance. Students work on predefined online course materials, at their own pace and on their own time. While students do have access to tutorial support, there are no instructor-led student cohort groups. For this study, students were asked to complete the survey through email requests and web page reminders, but there were no methods used to compel students to do so. This accounts for the relatively low response rate to the surveys. One demographic to note in this study is that while the

age of the students was not determined in this survey, it may be a factor in the outcome. Athabasca University lists the average of average age of their students as 29 years of age (Athabasca University, 2007). The restrictions of this survey regarding low survey responses and lack of demographic information should be addressed in future studies to better ascertain the significance of the outcomes.

CONCLUSION

While this research study confirmed that there was an interest in using mobile devices to access course materials by the SCIS students, the majority of responders felt they would use a desktop computer the majority of the time. The improvements to the SCIS course delivery methods including device detection and style sheet modifications were well-regarded by the learners, and overall most learners agreed with the usefulness and convenience of using mobile devices to access these. However, the online course developers still need to take an eclectic approach to access to these materials. At this point in time and based on the outcome of this research, the general consensus from this study group is that mobile devices do not significantly replace the use of the desktop computers in access to course materials for distance learning at Athabasca University's School of Computing and Information Systems. They do, however provide increased flexibility in course material access. Based on the written responses in the survey, the study also introduced several of the learners to the concept of using mobile devices for online learning. M-Learning research is continuing at Athabasca University and includes mobile English as a Second Language (ESL), personal learning spaces, Moodle integration, student modeling and adaptive learning, and location-based learning spaces. Continuing to explore the learner's experience and perception will be an important aspect of this research.

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