

Needs Assessment Report for Mobile Learning

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Date: 22 February, 2006

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Mobile Learning Needs Assessment Report

I. Executive Summary

This report was written in response to a request of the Software Engineering Department of Monmouth University. In the university's quest to remain technologically pertinent, they have requested that an inquiry be made towards the emerging technology known as mobile learning. The goal of this report is to evaluate the current state of mobile learning technologies that are currently available, and most importantly, to determine whether or not there is an urgent need for a university-level education institution to restructure its curriculum and pedagogical traditions to incorporate this learning trend. Two key areas that will be focused on are didactic efficiency and cost effectiveness.

The main sources of information for analysis that this report is based on are a twenty-five question web survey and technical and educational papers. Twenty-one graduate and undergraduate-level students participated in the web survey. The questions asked paid special attention to the preferences and concerns of the students. A majority of the respondents were willing and eager to employ wireless mobile devices in their studies, and believed that m-learning would be "moderately effective" in class, outside of class, and compared to desktop computers. However, at the same time, most students professed to learn best in a traditional classroom, and most did not like online learning because of a lack of face-to-face interaction with teachers and other students.

Meanwhile, the lack of a formal mobile learning standard and the wide range of incompatible platforms for mobile devices provide a significant roadblock to the continued growth of the technology. Additionally, a large majority of students have indicated that they are not willing to pay additional money on top of their tuition to subsidize the costs. In light of the issues mentioned above, it would be best to allow the technology to mature further, and to wait for an m-learning industry standard to be formalized before investing in the technology for the campus at large.

II. Introduction

On 1 February 2006, the board of trustees of Monmouth University requested the Software Engineering department to develop an assessment of the university's need for technological upgrades. In particular, it was requested that the focus be on mobile learning, and whether the benefits of its adoption would merit the costs and the changes to the university's learning traditions. The primary people involved in producing this report are Ercan Polat and Rita Lee, under the guidance of Dr. Jiacun Wang. Major components of this report are located in sections IV (Purposes), V (Limitations), VI (Questions), VII (Methods), IX (Results), and X (Recommendations).

III. Background

One of the most prevalent technologies in the 21st century is doubtlessly wireless technology. Millions of people are connected to each other through cell phones, which has steadily become the most dominant communication method in developed countries. Innovations and progress in wireless technology have changed the use of cell phones from just basic communication devices to information transfer, including but not limited to video conferencing, viewing TV, and connecting to the internet. Cell phone internet access may be the most important of the recent innovations to a cell phone's capabilities; all the features of the internet can be accessed by people on the go. In addition to the progress in telecommunication systems, homes and commercial companies are taking advantage of wireless technology. Wireless networks are becoming common in the home, and are practically an assumed convenience at stores like Starbucks and Borders, which provide wireless hot spots for the internet. People can go online while drinking coffee at a coffee shop or while waiting in the airport. Some airlines provide the internet for their customers, and some bus companies are providing these services as well. The widespread use of wireless devices has lowered the cost of these devices. Today a large percentage of the population in the United States can afford a cell phone, and even PDAs and laptops. There is a wireless device for any budget.

The wide use of wireless technology has impacted our lives in a variety of ways. One of the aspects of the accelerated lifestyle is that people are constantly busy, always moving around. Nonetheless, it is something that is here to stay, and the educational system has been making efforts to grow with the change. Electronic learning, or e-learning, was one of the preliminary steps taken by schools to reach more people. Its focus was to provide educational materials in any electronic format, whether it be online or on a CD-ROM. Now, the new development is mobile learning (m-learning), which focuses completely on delivering learning in small, personalized packages via wireless devices, whenever and wherever the person wants.

The main advantage of any distance learning is that students and instructors do not have to travel to the same location. It saves time and money, and gives students more freedom to study as their schedules permit. In other words, distance learning is convenient. An added benefit is that the educational institution providing the online

classes saves money because there are no overhead costs for classroom allocation and facility usage. However, a major disadvantage is that some students might not have the discipline to learn on their own without a physical instructor to put pressure on them.

All mobile learning is e-learning, but not vice versa. However, some e-learning systems such as Blackboard can be used in m-learning. Mobile-learning can be categorized by connectivity: online systems that require permanent communication between the system and user's devices, offline systems where material is downloaded to devices or a combination of both. By location: where the system can only be accessed inside university campuses, a good choice for laptops and tablet PCs; systems that can be accessed off-campus, ideal for PDAs and wireless phones because of long distance connectivity; or as most m-learning systems nowadays are implemented, as accessible both on-campus and off-campus. [3]

Mobile learning can be further described in terms of how it is used inside and outside of the physical classroom. According to J. Rochelle of S.R.I. International, handhelds are becoming popular because they "enable transition from the occasional, supplemental use associated with computer labs, to frequent and integral use of portable computational technology." [4] From this perspective, mobile learning can be described in the following ways:

- a. In class mobile learning
- b. Out of class, however under guidance of an instructor
- c. Out of class mobile learning

a. In class mobile learning:

Rochelle's keynote paper "Unlocking the learning value of wireless mobile devices", describes several types of mobile learning within the classroom: classroom response systems, participatory simulations, and collaborative data gathering systems. Instructors can pose questions to the students, whose answers are sent wirelessly (and anonymously) to the professor's device, which then collects the data and presents the results to the class as a chart. The group results can be used to stimulate discussion. In science classes, handhelds coupled with probes can be used to collect and graph data for water quality evaluations, and there have been PDAs coupled with cameras for a butterfly-watching learning system [2].

Mobile learning can even be as simple as providing every student and the instructor in a class with a Tablet PC. The instructor can write on his Tablet PC and this can be projected to the wall. The instructor's notes can then be transferred to the students' PCs through the wireless connection, so that they do not need to spend time copying everything. Mobile-devices can be used in many different ways to make class time more effective and efficient.

b. Out of class, under the guidance of an instructor:

Outside class discussions can be held online via video conferencing, discussion boards, live chat, etc. The students would have to attend the online meetings, and similar to a traditional class meeting, the instructor will be there to lead discussions and provide input. However, neither the students nor the instructors have to be in the same physical location.

c. Out of class mobile learning

The last type of mobile learning would be out of class mobile learning, without frequent instructor supervision. This method is very similar to e-learning, except that it provides students with a little more freedom. Instead of having to sit at a desktop terminal to take a distance learning course, students are free to study in small increments anywhere they want, during a coffee break or while waiting for the bus.

IV. Purposes

The purpose of this needs assessment is to confirm and clarify the existence of a need for incorporating mobile learning tools into the university's education processes. Current technological trends have focused on making devices that are increasingly mobile and convenient for the individual. However, more often than not, pedagogical practices still remain anchored in the traditional classroom setting, even as colleges and universities continue to upgrade computer laboratories and equipment. The emergence of e-learning was a step towards making learning more convenient by disseminating courses through the web and other electronic media, to be accessed by far-flung people with highly disparate backgrounds, schedules, and vocations. The next step would be to increase the convenience to that of a cell phone, and thus increase the ease and interactivity in learning on and off campus.

This is the basic premise for the university's desire to evaluate the technology available for mobile learning. However, since mobile learning tools have not yet acquired maturity, this needs assessment will take care to address disadvantages of m-learning and detriments to the performance levels of Monmouth University students should m-learning technology be implemented in its current commercial form.

V. Limitations

The biggest limitation faced for the writing of this document was time. Preparatory time was limited to about a week, with the questions for the questionnaire only being completed in the middle of the week. Therefore we could not use any of the other information gathering techniques available, such as interviewing, focus groups, or observations. We chose to focus on the questionnaire and online documents for primary information sources. However, the number of respondents to the our questionnaire was also limited due to the short response frame available; we were only able to collect responses from 21 individuals. The short time frame also limited the types of people who participated to the questionnaire. The participants were mostly undergraduate and graduate students, but the information gathering process should also have included professors, Monmouth University administrators and some software companies.

Another limitation came from the free web survey tool Zoomerang. Since we applied for a free account, we were not able to use all the features available, or design the questionnaire exactly the way we would have liked. For example, question 8 asks the participant if they ever took online classes. Nine participants answered 'yes' to the question. Question 9 asked if these online classes were effective. Eleven students out of sixteen who responded answered 'no' to this question. Technically, seven participants should not have answered question 9 since they did not answer 'yes' to question 8. However there was no way to restrict access to questions depending on a respondent's answers to previous questions.

VI. Questions

The purpose of the questionnaire is to collect information from different sources to use in a Needs Assessment for Mobile Learning. Below is a list of all the questions used in the questionnaire. Full questions, results, and responses can be found in the appendix to this report.

- 1.** What is your age?
 - a.** 17 – 21
 - b.** 21 – 25
 - c.** 25 -30
 - d.** Over 30

- 2.** What is your educational level?
 - a.** Undergraduate
 - b.** Graduate

- 3.** Do you own a PC or a laptop?
 - a.** Yes
 - b.** No

- 4.** What is your approximate computer literacy level?
 - a.** None (never used a computer)
 - b.** Some (for daily use)
 - c.** Moderate
 - d.** Very good
 - e.** Excellent

- 5.** Do you own a mobile device, such as a cell phone, PDA, etc.? If so, what device(s)? (select all that apply)
 - a.** Cell Phone
 - b.** PDA
 - c.** Laptop
 - d.** Tablet PC
 - e.** Other _____

6. If yes to the above question, what are your primary reasons for using these devices?
 - a. Educational
 - b. Entertainment
 - c. Work
 - d. Other _____

7. In any of your past and current studies, please list the types of technology used in or out of the classroom that was related to class studies.
 - a. Tablet PC
 - b. Laptop
 - c. PDA
 - d. Other _____

8. Please describe the nature of the technology used and how it was utilized.

9. How would you personally feel about using wireless mobile devices such as Tablet PCs, PDAs, and laptops for studies in and out of the classroom?
 - a. It would be great
 - b. It would be good
 - c. I don't know
 - d. I don't care

10. Where and how do you do the most learning?
 - a. In a classroom
 - b. In-class activities
 - c. Out of class, alone
 - d. Out of class, with classmates (both in-person and indirectly)

11. If mobile learning was available, would you prefer it?
 - a. Yes
 - b. No

- 12.** If answer is yes to question 11: Tell me three reasons why would you prefer?
- a. No need to travel
 - b. More freedom
 - c. Reaching of educational goals
 - d. Convenience
 - e. Other
- 13.** If answer is no to question 11: Tell me three reasons to not choose mobile learning?
- a. Prefer traditional class room teaching
 - b. Hard to ask questions
 - c. Hard manage time without an instructor
 - d. Other _____
- 14.** Do you thing mobile learning will be an alternative for traditional classroom learning?
- a. Yes
 - b. No
 - c. I don't know
- 15.** If not: Please explain why not?
- 16.** Given the chance, would you use a wireless mobile device for studies outside of the classroom? When and where would you generally use it?
- a. Yes
 - At home
 - Quiet place not at home (e.g. libraries, etc.)
 - Public place, variable noise-level (e.g. café, bus stop, etc.)
 - b. No

- 17.** How effective do you think a wireless mobile device would be for learning outside of the classroom?
- a.** Not Effective
 - b.** Moderately Effective
 - c.** Very Effective
 - d.** I don't know
- 18.** How effective do you think a wireless mobile device would be for learning inside of the classroom?
- a.** Not Effective
 - b.** Moderately Effective
 - c.** Very Effective
 - d.** I don't know
- 19.** How effective do you think a wireless mobile device would be for learning as compared to desktop computers?
- a.** Not Effective
 - b.** Moderately Effective
 - c.** Very Effective
 - d.** I don't know
- 20.** What advantages do you see with every student possessing a wireless device for class?
- a.** Improving the quality of education
 - b.** Effective use of class time
 - c.** Using advanced features of technology
 - d.** Other

- 21.** What disadvantages do you see with every student possessing a wireless device for class?
- a.** Wasting of time by learning the technology
 - b.** Loosing the focus of class material
 - c.** Extra cost
 - d.** Other
- 22.** What type of Internet applications would you consider are necessary to learn effectively?
- a.** Email
 - b.** Instant messaging
 - c.** Discussion boards
 - d.** Chat rooms
 - e.** Video conferencing
 - f.** Other _____
- 23.** Did you ever take any online classes?
- a.** Yes
 - b.** No
- 24.** Overall, did you find them effective?
- a.** Yes
 - b.** No
- 25.** If yes: What did you like about them?
- a.** Did not have to travel
 - b.** Managed my own time
 - c.** Other
- 26.** If no: Why you didn't like them?
- a.** No teacher to ask question
 - b.** Hard to manage time by own
 - c.** Easy to lose focus
 - d.** Others _____

- 27.** Assuming you had a choice to complete your education via mobile learning, how much extra would you willing to pay for the technology?
- a.** Nothing
 - b.** \$100 - \$250
 - c.** \$250 - \$500
 - d.** \$500 - \$750
 - e.** \$750 - \$1000
 - f.** Over \$1000

VII. Methods

Questionnaires were the primary source of raw data for this assessment report. The procedure the authors followed in order to develop the questionnaire is as follows:

- The two authors of this report drafted a set of potential questions on their own time. They avoided reading each other's questions in order to prevent any bias.
- The authors emailed each other their questions, and one of them combined the lists and performed some editing to aim the questions towards the needs of a higher education institution.
- The authors met face-to-face and performed a thorough editing job on the list of questions.
- After editing, they inputted the questions into an online web survey, so as to increase the ease of distributing the survey.
- Each author used email to distribute the URL to the web survey to known contacts, requesting a response within two days (due to time constraints mentioned in Section V).
- Responses were collected from the web survey webpage and analyzed.

For general research for this report, online documents on mobile learning were accessed in order to write some of the sections. The majority of the documents that were accessed were technical papers written by educators and researchers for various scientific and computing journals and publications.

VIII. Results

Twenty-one individuals with the median of age 26 and an average age of 29 participated in the web survey (questionnaire). 57% of participants were female and 43% of them were male. 62% of the participants were graduate students and the rest were undergraduate students, majoring in different fields. The questionnaire pointed out that all the participants had minimum of moderate level to excellent level of computer literacy. Most participants possessed wireless devices such as cell phones, PDAs, and laptops. As expected, cell phones were used for communication. Students used laptops for schoolwork, research, communication (emails, IM), entertainment, and as a storage repository. Age was asked as the first question to see if there was any correlation between age group and the types of mobile technology that individuals would most likely use regularly. In general, the phenomenon has been that cell phones are the most popular accessory among younger teenagers, whereas older people in business fields also favor laptops and PDAs. The sampling for our survey was not enough to provide conclusive evidence of this, but the results do show that nineteen of twenty-one adults mostly around their mid-twenties own cell phones. Also, since 62% are graduate students, it is most likely they also work part-time or full-time as well, suggesting that laptops, which was next most owned mobile device, was used for work as well as school.

43% of the respondents took an online course during their education. The main reasons cited in favor of online classes was convenience; students liked to be able to take the course at their own pace and at their own time. One also said that he/she liked not having to travel to go to class. However, 69% of respondents did not find these online classes effective, for many reasons. The first outstanding reason was that online courses did not have face-to-face communication between students and professors. If a question arose, the student would be unable to quickly ask and receive an answer. It was also difficult to form study groups and network with other online students who are only represented by a name. Also another important issue was that it was not easy to concentrate on the course and study online because of distractions. It should be noted that not all of the ten individuals who responded took online courses; reasons for this is described in Section V (Limitations). The numbers for questions 10 and 11 are as follows: Nine people took online classes in the past. However, only five of the nine gave positive reasons for taking online courses; eight of ten people gave negative reasons, and the remaining two of ten were uncommitted. Again, a larger sampling of respondents would provide more conclusive evidence, but the results we do have suggest that people tend to favor traditional classroom learning. This is further supported by results from question 14: 62% said they did the most learning in the classroom. 24% said they studied best outside of the classroom and alone; 10% studied best out of the classroom but with other classmates. One respondent preferred both in-class and out of classroom learning.

Question 7 asked participants what Internet applications they thought were necessary for effective learning. Email was the #1 application with 88%. Next were discussion boards at 67%, then instant messaging at 52%. Chat rooms and video conferencing were at the lower end of the scale at 29% and 33%, respectively. One respondent mentioned regular Internet browsing. It should be noted that all of these

applications are easily available without mobile devices, especially the three most popular applications. Also, looking at the results for question 17, which asks for reasons why students would not use m-learning technology, many said that instant messaging would give ample distractions in class, not to mention Internet surfing, games, and shopping if the network was not set up as an Intranet. It would seem that introducing m-learning technology into the classroom might very well degrade the learning experience that many prefer over learning out of the classroom.

Questions 15 through 24 concerned participants' views on m-learning and its effectiveness in education. 67% stated they would like to use m-learning technologies if they were available. Reasons given were convenience, greater efficiency, more interactivity, and the anticipation that it could be a useful learning tool. Reasons against using m-learning were that the current system of learning works fine, and that lack of discipline would hinder learning on one's own. 48% said that m-learning will be an alternative to traditional classroom learning, 58% disagreed. When asked how effective they thought a wireless device would be for learning outside of the classroom, 57% thought it would be "moderately effective" (i.e. 3 in a range of 1-5), 19% thought it might be "somewhat effective" (i.e. 4 or 5 in a range of 1-5), and 14% thought it might be "very effective" (i.e., 5 out of 5). When asked whether wireless devices would be effective for learning inside the classroom, 35% thought it would be moderately effective, 40% thought it would be somewhat effective, and none thought it would be very effective. When asked to compare the effectiveness of mobile devices to desktops computers, 52% said moderately effective, 24% said somewhat effective, and 14% said very effective. It seems that overall, participants either are not familiar with m-learning to make an accurate judgment and so choose the middle value out of caution, or they do not feel that mobile learning will create much of an impact either way, except in the case of stationary desktop computers.

Another important result concerned money. The last question in the questionnaire asked: how much extra would you willing to pay for the technology on top of your tuition? — 62% of students did not want to pay anything. 24% were willing to pay between \$100-\$250 extra, 5% for \$250-500, 5% for 500-\$750, and 5% for an increase of \$750-\$1000. No one was willing to pay \$1,000 to \$2,000 extra on top of their current tuition.

This section highlights key areas of interest from the questionnaire. The full results of each question can also be found in the appendix of this report.

IX. Instrumentation

Time and cost limitations prevented the authors from seeking out other available tools for data collection and analysis. The only instrument that was used was the online tool, Zoomerang, which provides free web survey creation services. However, since the basic service account is free, it has limitations. The site does not allow all of its web survey functionality to be used by free account users. A basic description of Zoomerang is that it provides templates for different web surveys, and the user is free to select one that best matches his/her needs. The survey can then be edited further by allowing the user to define question characteristics. When the survey is completed, it provides an URL to the web survey, which the user is free to distribute. Once there are responses to the survey, the user can log back into the site and view the results, which are presented as graphical charts or as lists of open-ended responses, depending on the characteristics of the original questions.

X. Recommendations

After careful analysis of publicly available literature on mobile learning and the student responses, the authors have come to a conclusion. Wireless and mobile technologies are a part of our daily lives. Many people use these technologies for different reason, and they provide many advantages for everybody. By all appearances, at least half of the student body is willing and eager to try out m-learning technologies. 52% say that “it would be great” to use wireless devices for studies; only 5% directly opposed it, and the rest did not know or did not care. Also, 67% said that they would like to use m-learning if it were available. Unfortunately, 62% are not willing to pay anything extra on the top of their tuitions. As the cost of a university education continues to rise, it would probably be very difficult for many students to invest in mobile-devices such as Tablet PCs or PDAs. However, if the school were to provide the required hardware, it would be inevitable that tuition must increase in order to cover the costs. Further burdens on school budgets would be the fact that mobile devices that are too small could make schoolwork-related usage very inconvenient. For example, common office applications such as Microsoft PowerPoint would be extremely inconvenient to use on anything smaller than a laptop.

Also, just having an additional mobile device is not really enough for education purposes. The main idea is to have sophisticated software that will utilize mobile devices to increase the effectiveness and efficiency of classroom time. However, currently there is no standard for mobile learning. [3] The natural result of this is a wide range of incompatible, and thus financially risky, handheld environments (ex. PalmOS, Java, WinCE, Symbian) that inhibit the willingness of software publishers to develop programs for them [4]. Standards, however, are politically very difficult and slow to set, especially when the exact standards that are needed are still unformed. It is obvious that even though the hardware for mobile technology is mature enough to launch mobile learning, the software side is not ready at all.

Additionally, factors concerning the student body could pose an obstacle to successfully implementing mobile learning. 69% of the survey participants did not like online classes, and reasons given for this were the lack of face-to-face interaction with the instructor and other students, difficulty to contact the instructor about questions, and the problem of concentrating on coursework when not physically in a classroom. It should be noted that in the survey, 62% of the participants said that they learned the most in the classroom (either individually or in group activities). Conversely, no one believes m-learning will be effective in the classroom; 40% believe it might be “somewhat effective” (4 out of a range of 1-5). However, if Monmouth University were to focus on in-class m-learning systems, there is the high probability that increased cheating and chaos could be introduced; for example, wireless connectivity in the classroom might only increase instant messaging between students.

As a result, for the above stated reasons, the authors believe it would not be good timing to launch mobile learning at Monmouth University for at least three more years, if not longer. It is recommended that the university wait until wireless technologies are further developed, to see what further innovations for less cost are being offered. In addition, the extra time would allow more work to be completed on developing an industry standard for mobile learning technologies.

XI. Conclusion

Monmouth University seeks to determine the need for incorporation of mobile learning systems and the requisite wireless technology into its campus and classrooms. Mobile learning, or m-learning, can be defined as the delivery of training by means of mobile devices such as Pocket PCs, mobile phones and Palmtop computing devices. Mobile learners are seeking "just in time, just for me" lessons in small manageable formats that they can undertake when it suits them. According to a survey sampling twenty-one undergraduates and graduates, 52% of students were eager to use mobile devices for study inside and out of class, and 69% were willing to use m-learning technologies if it were available. However, only 14% of the students believe m-learning will be very effective outside of the classroom, and none of the participants thought it would be effective inside of the classroom. Additionally, 62% of respondents are not willing to spend any money on top of tuition to subsidize the required technology.

XII. Reference

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