Determining Students' Readiness for Mobile Learning

ANNA TRIFONOVA
Dep. of Computer Science
University of Trento
via Sommarive n.14
38050, Povo, TN, ITALY

EVGENIYA GEORGIEVA
Dep. of Computing
University of Rousse
8 Studentska Str.
Rousse 7017, BULGARIA

MARCO RONCHETTI
Dep. of Computer Science
University of Trento
via Sommarive n.14
38050, Povo, TN, ITALY

Abstract: - Mobile Learning is rather new, but rapidly growing research domain. This paper presents part of a study that we have performed to investigate the university students' readiness to utilize mobile learning. About 600 Italian and 200 Bulgarian students participated in an online questionnaire in June 2005. They were asked about the availability of devices, about their willingness to use m-learning, etc. We studied in depth also similar studies conducted in other countries and confronted the outcomes. The analyses show that the students are mainly positive to the prospective of accessing mobile learning. The attitude differs, depending mainly of their previous experience and current habits. Sometimes gender differences can be noticed and the availability of devices and students' income influence the student's attitude. Things like nationality or studied subject does not seem to influence the future of mobile learning.

Key-Words: - Readiness for mobile learning, University students' opinion, Influencing factors

1 Introduction and Context

Provoked by the fast advances of mobile technologies different m-learning applications and systems are developed continuously [1]. A wide variety of devices are used - cell phones, PDAs, laptops, etc. The target groups also vary – kids and grown-ups, medical personal and people with literacy problems, self motivated or supervised. We have performed a questionnaire over a concrete target group – university students – in order to study the potential of an m-learning system in university environment.

Students from two universities – University of Trento (Italy) and University of Rousse (Bulgaria) were asked to fill-in an online questionnaire. The participants were given single or multiple-choice questions to answer and for some of the questions they had to write in free-text an explanation of their opinion, argumentation for certain answers and describe their idea, view or imaginary picture. The questions were split into thematic groups, like "Availability of devices", "E-Learning Usage", "Opinion about prices" and etc.

About 600 Italian students participated from the University of Trento. They were mostly from the Science and Engineering specialties, but also from more humanitarian faculties, like psychology, economics, languages and other. Considering gender 71.1% of the participants were males, which is due to the fact that a big part of the participants (more than 50 %) was from the engineering disciplines, where in general the percentage of male students is

noticeably greater than the one of females. The students were smoothly distributed between the different years of their study (both bachelor and master) and mostly less than 25 years old. About 95% of the Italian participants were of Italian nationality.

Bulgarian students were about 200 and were with more smooth distribution considering University faculties. Nevertheless also here students from technical specialties were more then 60%. Also here the main age group was under 25 (78.3% of the participants) and the boys were slightly more than the girls. Different years of study were almost equally covered.

A complete report of the students' answers, full statistical data and comparative graphics can be found separately [2]. Additionally, a profound study of the correlation between the e-learning usage and the attitude towards m-learning, based on the same questionnaire, can be found in [3]. In the current paper we present mainly the results related to m-learning and mention only briefly other outcomes.

2 Findings

First of all we should mention that very little of the students participating in our survey knew what mobile learning is and have ever used it – only 4.6% of the Italian students and 2.5% of the Bulgarian participants. All of them use also e-learning and were mainly boys (74% of the Italian and all Bulgarian participants). It should be underlined that

m-learning platform is not offered by any of the two universities for the studied subjects.

We asked the students three main questions:
1) would they like to use m-learning and why;
2) will in their opinion m-learning increase the quality of education and why;
3) what services shall mobile learning provide.

Q: *Would you like to use m-learning? Why?*

Almost 60% of Italians said they would like to try m-learning. The most often given reasons for positive attitude to m-learning is the students' curiosity and willingness to use new technologies and innovations - about 35 % out of all positive answers. Answers like "I love technology" or "I like anything that has to do with technology" or just "Why not?" were not rare. Other answers show expectation for increased accessibility to learning materials, real-time information, time-saving and better time scheduling, more freedom and flexibility.

Some students describe their view of m-learning as a way to substitute traditional learning, e.g. "I will not travel 30 km. to participate to the lectures" or "I will be able to watch the lectures while lying on the grass near the lake or traveling in the train".

In some cases students do not think they belong to the potential users of m-learning but still have a positive attitude (for example "It might be useful for those who can not participate in lectures nor use e-learning"); others say they can not use m-learning, as they don't have the needed devices.

On the other hand quite often the explanation of a negative attitude is "I'm not interested" or "I don't see it useful". There are students which prefer more traditional approaches – books, paper notes, etc. These are generally the same people that do not use e-learning for the same reason. Many students feel that there might be a lack of interaction between teachers and students – more than 25 % of the negative answers. There is also the opinion that this new technological approach will bring distraction and will generally increase the study time, and thus is out of consideration.

Other repeatedly given argument against m-learning is that PDAs and cell phones are not able to give more to a learning system than what already exists in e-learning, ex. "Internet is good enough!"; "Better e-learning"; "I believe it will not be that handy as e-learning" and "I don't find it useful to do with the cell phone or a PDA in much less comfortable manner what I can do with a laptop". Further, students mention as obstacles the high cost of the devices and the connection, the small devices are not enough technologically advanced to be useful for education (mentioned the small screens, small space, etc.), not comfortable for long periods of usage, might lead to health problems e.g. "May cause eye troubles".

From Bulgarian side there is more potential interest – more than 80% of the participants would like to try m-learning. The most often mentioned reasons are that there are no limits in terms of time and place; it will give more easy and convenient access to learning materials; it is modern educational technology; it will be attractive and useful. Students often mentioned more than one reason to use mobile learning. On the other hand, the most frequently mentioned reason for not using m-learning is the lack of financial resources - high prices of mobile communications and devices; limited or no access to mobile networks; the students' mobile devices don't support new mobile technologies as GPRS, EDGE, etc. Some students do not feel any need to use it or find m-learning is unsuitable format to present information. Many feel they are unfamiliar with this technology (mainly students from faculties different from engineering) and others think that the quality of education will decrease. Only few answers are totally negative - "It is unnecessary", "I don't find any advantages and application of m-learning", "I don't like this education!".

Q: *In your opinion will m-learning increase the quality of instruction? Why?*

Though lots of students are curious and would like to try m-learning some (57% of Italian and 27% of Bulgarian students) have major doubts if the quality of instruction will increase by using small mobile devices in university education. Moreover, it seems students do not connect the quality of instruction with the addition of supporting services via mobile devices. One often given reason at the University of Trento for m-learning not augmenting the quality of instruction is that during lectures mobile devices generally distract people instead of helping them concentrate.

The students that think m-learning will increase the quality of the University education very often motivatie it in one of the following ways: increased availability of real-time information; availability and accessibility to more information; increased freedom (i.e. location-independence); higher integration of the study process into everyday life; time-saving; more interesting form of the study-process, thus higher motivation to do it.

Some students predict that m-learning will be used by only few person, thus even if the presumed mobile learning system is very nice and useful the University education in general will not become better for the major part of the students.

Some of the answers put into mind the thought that there was no full understanding and sometimes

there was even misunderstanding of m-learning and its potential. For example, in one student's comment became clear that he excludes the possibility that an m-learning platform is web-based, or another student that wrongly believes it is impossible to visualize lectures' slides into mobile devices (probably considering only cell phones), etc. In the questionnaire we gave only a 2-lines loose definition of what mobile learning is. We should mentione also that in some cases the students wrongly connected the idea of mobile learning with the one of video registered lectures accessed via mobile devices, which was by oversight influenced by a previously given questions about video lectures in an e-learning system accessed via Internet or on CD. Probably this led also to lots of the negative reactions to m-learning, as people see the devices not strong and comfortable enough for looking video on them. In our opinion a different (probably more positive) outcome might be expected if the students are given more concrete scenarios and situations embracing mobile devices in different learning processes.

It was noticed that quite a big part of those who answered that they would not like to use m-learning still think that its existing will increase the quality of instruction (about 10%). Most of them are students who think that lecture attendance and the immediate contact with colleagues and professors is very important. Nevertheless, they consider m-learning might be very useful if for some reason other students can not be present at the lectures.

About 25% of those who declare they possess a PDA type device say they would not like to use any m-learning system. Reasons: lack of humanity and personality, too much distraction, while learning demands good concentration. Few people declare that they would tolerate m-learning only in the cases that it is an additional support to traditional methods or in cases they are hindered from participating in the face-to-face lectures.

We must also mention some original students' answers: "The quality of education don't increase in dependence of the place from where you learn, it increase in dependence of your wish to learn", "The modern student is delocalized and the educational institutions must encourage his/her global thinking and performance and not to restrict he/she in terms of time and space", "The students can participate in interesting lectures which are not in the frame of their educational profile".

Q: Which services the mobile learning must provide? Describe how you imagine a mobile learning system.

For this question the students were first given a list of possible services and had to check which seam

useful for them. Afterwards they were supposed to describe what they imagine will be offered by a mobile learning system and what are the services they consider valuable. Big number of students' answers discuss as possible services all or part of those mentioned in the list given by us. Others suppose m-learning should provide the same functionalities as e-learning whenever possible.
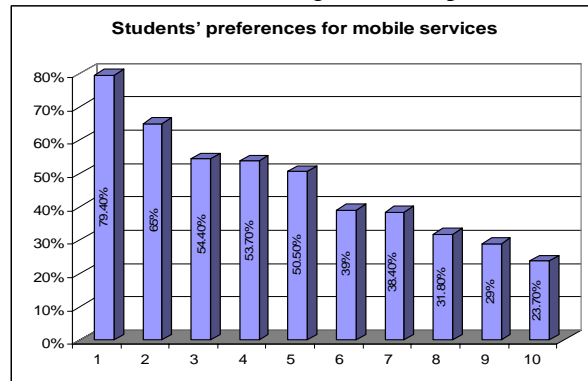

Figure 1: Students' preferences for mobile services

Summing up, students ranked the expected m-learning functionalities in the following order:
1. To access supporting educational information (e.g. schedulers, exams results) via WWW (79.4%)
2. To communicate with teachers (65%)
3. To access educational content online (54.4%)
4. To communicate with other students (53.7%)
5. To receive supporting educational information via SMS/MMS on demand/request (50.5%)
6. To fill-in tests and questionnaires for exams (39%)
7. To collaborate with other students (38.4%)
8. To fill-in tests and questionnaires for self assessment (31.8%)
9. To access educational content off-line (29%)
10. To receive supporting educational information via SMS/MMS always (23.7%)

As one can see also in the fig. 1 more positive weight is given to supportive services. Few people mention that they just can not imagine the didactic material viewable with mobile phone, but are very optimistic for the rest. Some mention the fact that they expect the these services to be free of charge for the regular students and teachers of the University, based on authentication. Often vision is of a system utilizing the university wireless network, sometimes supposing a high-bandwidth connection.

Interesting supposition very often found in the answers is that mobile learning should be the medium to facilitate the student-student and student-teacher communication and collaboration, probably because of the students perceiving the cell phone

mainly as a device for conversations. Other repeatedly given hint is that a nice university m-learning system should be strongly integrated with the university e-learning and available there services. An imaginary by students' m-learning system is often quite complicated and should offer all possible features, including rich multimedia and video. Only in some rare cases the students presume 'simple' software with 'clear' functionalities, though often assumption is the simple and intuitive interface, fast and comfortable system.

Other interesting views:

"It should reproduce the university environment. It should provide all services provided in the Secretariat (like certificate requests and etc.). It should facilitate the communication between students and teachers and push the students to interact between themselves (via forums, instant messaging, e-mail, etc.). Different lectures should be available on the net, in video/slides and text or at least providing full references."

"First of all it should be fast and constant (the service should be always available)"

"I think that the technology already exists (PDAs, cell phones, notebooks). They only have to be made useful and be used. The big problem is often the cost"

"… It will be very nice to be able to integrate the lecture notes with the video registered lecture…"

To sum up the main services which m-learning must provide: to support rich and actual educational information; it must be an information system to support traditional learning by providing the following: a timetable, abstracts of lecture themes, test and exam results, messages, to carry out tests and questionnaires; to ensure fast and convenient access to learning materials conformable to the resources of mobile devices; regularly to send information via SMS/MMS about news or changes; to ensure abilities for the students do download and read off-line files on mobile devices; to present briefly and clear the information on subjects; to ensure more close and fast connection between students and teachers; to ensure active connections with other e-learning systems.

Finally more than 66% of the students see the future of m-learning as a support system for the traditional forms of instruction. The percentage of the students which consider m-learning can work as an autonomous system is almost equal to the percentage of those that think m-learning has no perspective (a bit less then 10%). About 15% do not have opinion about its future.

Availability of devices: One of the main concerns when trying to introduce a new service or technology (in our case this is m-learning) is who will be able to use it. This partially depends on what devices will be used, how many users posses those types of devices, but also if the users are prone to spend money for acquiring a device if a new service that needs one appears.

Our study (see fig. 2) shows that the cell phone is most widely possessed device, followed by the PCs that are also often owned by all participants of this study. In addition Italian students often have also laptops. Only some students have PDA, videophone or Smart-phone and their percentage is even smaller for Bulgaria (less than 2%).
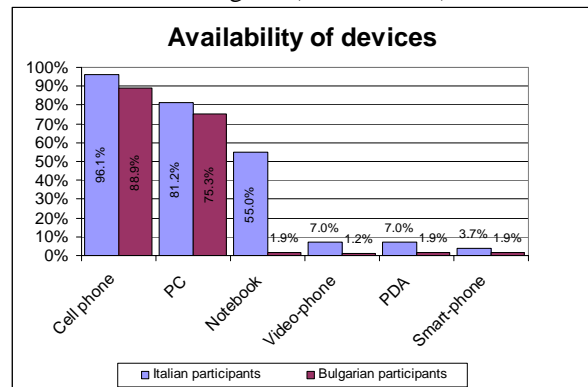

Figure 2: Students' availability of devices

The devices that are mainly involved in the research in m-learning are mobile phones and PDAs. So we asked the students about the reason for them not to have one. The answers differed in Italy and in Bulgaria. Considering PDAs for most of the Italians the main reason is that such device is not useful for them (59.4%), followed by the high price of the devices (41.6%), expensive wireless services (13.9%), devices' limited resources (11.1%), etc. For Bulgarian students the major concern is the high price, both for the devices and for the wireless services (more than 75% of all answers) and only after this comes the answer that the device is not useful (12.2%) and the limited resources of the device (5%).

Analyzing the answers of those who posses a PDA device we have noticed that more than 20% of them (for Italy) have tried at least one m-learning solution. Though this percentage is based on very few participants answers it was noticed that it is much higher than the one of people without PDAs. From Bulgarian side no student that owns a PDA have ever used m-learning. The attitude to all of them though is noticeably more positive. Nevertheless their expectations to what functionality to be provided are very similar to all other students.

Opinion about devices' and services' prices: When asked about the prices of the devices the

general opinion is that PCs and cell phones have normal costs. On the other hand, the prices of laptops and PDAs are considered mainly high (by more than 52%). Moreover, lots of the students have no interest and thus no opinion about the prices of Smart phones and PDAs.

When talking about prices of services, the usage of cell phone is still considered costly by 66.4% of Italian and 72% of Bulgarian students. Less then 2% of the participants consider these prices low.

The situation differs little when talking about the prices for using Internet - the opinion that the prices are high is supported by about 50% of the participants.

Devices and services usage: We have tried to discover how our participants use the devices and services available to them so that to see if we can anticipate its influence on mobile learning.

Students report that they access Internet mainly from home and at the university/work. They use it for variety of activities – for searching for information (97%), for studying (82%), for entertainment (74%), for online shopping (30%), etc. Relatively small number of participants utilize their cell-phones for accessing Internet (7.2% in IT and 14.3% in BG). Almost everybody is using the phone for conversations (about 98%) and for send and receive SMS (93%). Nevertheless they report small number of SMS send and received daily. For Italy less then 5 SMS a day are sent by 67% of the students and received by 65%. For Bulgaria these percentages are even bigger.

To sum up, both Internet access and cell phone usage are considered costly, but are widely utilized. However, our participants rarely access the Internet is via their cell phones.

Ways of usage and attitude to e-learning platforms: Mobile learning is often considered the next step of e-learning provoked by the new mobile technologies. It was noticed that there are some differences in the ways students use e-learning and one of the presumptions that we wanted to test was if those differences extend to their attitude to m-learning.

A strong correlation was discovered between the way e-learning is used and the attitude towards m-learning. The noticeable trend is that those who do not use e-learning are most negative to the value of m-learning and its future. They often think that the PDAs are not useful and even do not want to try any m-learning solution. On the other hand, students that utilize the university's e-learning platform are more positive. Generally, the ones that use more then one e-learning platform are the most positive towards m-learning. Nevertheless, when talking about the

services that should be provided by a provisioned m-learning system no insignificant preferences can be found for grouping based on this criterion.

In a separate paper we have presented in more details the analysis on the influences of e-learning on students feelings about m-learning [3].

Gender: Some gender differences were noticed throughout the questionnaire. The differences might be qualified mainly as slightly more positive attitude and interest of male participants to technology in general, thus to new things and experimentations. It was noticed a 10% gender difference in the type of available Internet connection Italian students have at home (Modem F-46.6% vs. M-35.9%; ADSL F-45.9% vs. M-56.5%). Our interpretation is that often males tend to acquire the newest and fastest technological solution. More female participants have the feeling that prices of PC and Notebooks are high, but on the other hand they consider more often the prices of cell phones and services as normal or low. Male participants are more aware of the prices of PDAs and Smart-phones. In our opinion these findings might be an important factor when choosing what an m-learning system should provide. In the cases when a new device should be acquired we should expect more males to be interested at initial stages, while if the medium of providing the future m-learning services is a well-known one (e.g. cell phone and SMS) females are more eager to explore it, thinking less about the price.

Males are also more convinced that m-learning would enhance the quality of instruction (both for Italy and Bulgaria with about 10% difference comparing to female answers). This might be also explained with girls feeling more comfortable with more traditional tools and media.

Nationality: There are noticeable differences between Italian and Bulgarian students' opinions only for few parameters. In some cases the differences in the answers might be due to the much lower general income of Bulgarian students. Though we did not directly ask the students about their incomes some deductions can be made based on their answers. For example there are almost no Bulgarians that consider any of the prices low. This percentage is quite often small also for Italians, but the difference is sometimes up to 10%, e.g. prices of PCs and cell phones. The balance changes only when talking about the price of Internet connection where 10% more Bulgarians consider it normal. This is probably due to the fact that in Bulgaria there are wired network providers and cable-TV operators that often provide also quite cheap Internet. Though these seem national differences in our opinion the origins should be searched elsewhere. On first place

for the students important is the cost, both for acquiring the devices needed to use a certain system and the price to be paid to access its services. One can see this also in the students' opinion about prices – for any kind of device 10% more Bulgarian consider its cost higher comparing to Italians.

However about 10% more Italian students do not use any e-learning solution and the general attitude of Bulgarian students both to e-learning and m-learning is definitely more positive. About 10% more Bulgarians think e-learning enhances the quality of their education and more than 20% more Bulgarians are eager to use m-learning. The difference becomes even 30% when the question is if mobile learning will increase the quality of instruction. Our suggestion about this difference is that in the last year or so at the University of Rousse different surveys and questionnaires are given to students to find out the ways to improve the quality of instruction and often students see the changes based on their suggestions. In those surveys mobile learning is often mentioned and students are probably more informed and more optimistic about its success.

Studied subjects: We did not find any specific differences depending on the studied subjects. The small exception makes the fact that the percentage of the students of University of Trento from non-technical specialties that use any e-learning platform is bigger comparing to engineering specialties (unexpectedly) – more than 80% vs. about 63%. On the other hand "non technical" specialties generally use only the University's platforms, while about half of the engineers use also other platforms. As the situation at the University of Rousse differs, i.e. engineering specialties use much more often e-learning and big number of non-technical specialties students use more than one platforms we think that the reason should be searched in the quantity and the quality of the material offered by specific courses and programs.

We shall mention that we were not able to study well if differences can be found according to the age of the students, as our participants were much concentrated in one age-group, namely less then 25 years old.

3 Conclusions

Here we presented the outcomes of a parallel survey made throughout Italian and Bulgarian university students. The goal was to discover important parameters that might influence the success of a provisioned mobile learning system. These parameters should be closely observed and cautiously considered in design phase.

Our findings show that students' attitude is strongly related to the ways and frequencies of usage of e-learning. Students that are comfortable and use willingly e-learning are much more positive to m-learning.

A very important factor for a successful m-learning solution will be the choice of devices to be used. Generally students opinion is that (except cell phones) small mobile devices and their exploitation are very expensive. Most of them will not be eager to buy device, unless they see very strong positive ways of its usage. Better solution seams to utilize the devices already possessed by the students. Mobile phones that have much increased recently resources seem to be the best choice in University environment, though the wide variety of models might be a problem. Nevertheless the price of the service is always very important for the students.

The general attitude to technology is also a strong factor. Males tend to be more interested to experimenting and trying new things, while females often prefer traditional approaches. However, once accustomed to a certain media type girls tend to use it more often. This should lead to the expectation that in a newly developed m-learning system the initial users will be more male.

We couldn't find any differences in the students' attitude to m-learning connected to studied subjects and specialties, nor to nationality. Nevertheless, all students expect a strong support of wide variety of services, well developed and often updated m-learning platforms with strong integration to e-learning solutions.

In our opinion the future of mobile learning is bright, though lots of effort should be done to satisfy students' high expectations, so that to ensure a high rates of its utilization.

References:
[1] Trifonova A., Ronchetti M. (2003). "Where is Mobile Learning Going?". *Proc. of E-Learn 2003*, Phoenix, AZ, USA, Nov. 7-11, 2003.
[2] Trifonova A., Georgieva E. (2005). "Determining the Readiness for Mobile Learning". *UNITN Technical Report* [available online at http://eprints.biblio.unitn.it/]
[3] Georgieva E., Trifonova A., Georgiev T. (2006). The Influence of the Usage of e-Learning on the Students' Expectations about m-Learning. Proceedings of the e-learning conference '06, Sept. 7-8, 2006, Coimbra, Portugal.