

The Influence of the Usage of e-Learning on the Students' Expectations about m-Learning

Evgeniya Georgieva

University of Rousse
8 Studentska Str., Rousse 7017,
BULGARIA
+359 82 888 276

egeorgieva@ecs.ru.acad.bg

Anna Trifonova

University of Trento
via Sommarive n.14, 38050, Povo, TN,
ITALY
+39 0461 882076

trifonova@science.unitn.it

Tsvetozar Georgiev

University of Rousse
8 Studentska Str., Rousse 7017,
BULGARIA
+359 82 888 276

tgeorgiev@ecs.ru.acad.bg

ABSTRACT

Mobile learning (m-Learning) is a next stage of the distance learning development. The wide accessibility to mobile devices and the possibility to learn independent of place and time make the mobile learning an important tool for lifelong learning. The focus of this paper is on the influence of the usage of e-Learning on the students' expectations about m-Learning. For this purpose in 2005 year a joint investigation among students from the University of Rousse (Bulgaria) and the University of Trento (Italy) was done. An analysis of the results from this investigation was made. The results are compared to the ones of an equivalent study, performed at the University of Rousse in 2004.

Categories and Subject Descriptors

A.1 [Introductory and survey], K.3.1 [Computer Uses in Education] Distance learning

General Terms

Experimentation, Human Factors, Verification

Keywords

Mobile Learning, E-Learning, Distance Learning, Lifelong Learning

1. INTRODUCTION

The recent fast development of the information and communication technologies leads to the introduction of new forms of education. The approaches of the distance learning are slowly entering into the Bulgarian high education as it happens all over the world. Modern centers for distance learning that use e-learning platforms are appearing continuously. In certain cases they support the out-of-class work of the face-to-face lectures by providing access to the learning materials, references and etc. In other cases the full educational process is computer mediated.

Mobile learning (m-Learning) is a new line in the development of computer supported and distance learning. In m-Learning mobile devices are used to access learning related services and educational content anytime and anywhere. This will probably make m-Learning a very good assistant during university education. However, mobile devices might be used also after the formal education, all through our lifetime. Possibilities are wide, but there are many questions that need to be answered and problems that wait to be solved.

The predictions that the introduction of mobile devices in education will play an important role in the future of learning had pushed us in conducting a study on the influence of the e-learning usage over the students' expectations about m-Learning. This study is part of a bigger analysis consisting of 50 questions about the readiness of the students to use m-Learning. A complete report of the students' answers, full statistical data and comparative graphics can be found in a separate report [10].

There are many investigations and surveys about different aspects of mobile learning – technological, pedagogical, etc. In [16] is described an investigation about use of PDA (Personal Digital Assistant) devices by the students of the College of Agriculture and Life Sciences at North Carolina State University. Analysis of the use of PDAs and Laptop computes during the students' study are reported in [8]. Some of the surveys concern the use of mobile learning [1, 2, 3, 19] and include questions about students' experience, like whether they like this new educational form, whether they would recommend it to other students, etc. Other authors include in their investigations questionnaires about ownership of mobile devices, the use of mobile Internet, mobile communications, etc. [6, 7, 9, 17].

The disadvantage of these papers is that part of them describes the results from investigations which are not directly connected to the m-Learning. The other part includes data only from experiments with mobile learning. Up to now the authors of this paper did not find a research on the factors that influence students' expectations about m-Learning.

In this paper is presented an investigation on the influence of four independent variables – country of residence, current use of e-learning, preference of pedagogical methods and ownership of m-Learning devices on the dependent variable “students' expectations about m-learning”.

The reasons to choose Bulgaria and Italy for this analysis are their differences on economic and ICT indicators (Table 1).

Table 1: Comparison between Bulgaria and Italy by five indicators

Indicators	GDP, per capita (US\$) 2004 [12]	Cellular mobile subscribers per 100 inhabitants 2005 [13]	Internet users per 100 inhabitants 2004 [15]	PCs per 100 inhabitants 2004 [15]	E-readiness rankings 2006 [20]
Bulgaria	3100	80.83	15.90	5.94	46
Italy	28664	123.14	49.78	31.29	25

From this data it is easily to see that Gross Domestic Product (GDP) per capita in Italy is 9 times higher than those in Bulgaria. There are also differences between cellular mobile subscribers, Internet users and PCs per 100 inhabitants. This year Italy takes 25th place in the world ranking of e-readiness while Bulgaria takes 46th. In another investigation [18] Italy takes 6th place in the world ranking of the users of 3G communication services (5.7 millions). E.Valentine reports [11] that in 2002 Italy stood in first place considering the percentage of cell phones possessed by the 20-24 years old people (94%).

That's why it is interesting to analyse how the economic and ICT differences in these two countries and the usage of e-Learning influence on the students' expectations about m-Learning.

Students from two universities – University of Rousse (Bulgaria) and University of Trento (Italy) – participated in the study. The number of the students which study in these universities is approximately equal – over 10000 students in the University of Rousse [21] and more than 13000 students in the University of Trento [22]. About 200 Bulgarian students and about 600 Italian students filled-in an online questionnaire that contained mainly single or multiple-choice questions in Bulgarian and Italian language respectively. For some of the questions students had to write in free-text an explanation of their opinion, argumentation for certain answers they gave previously and describe their ideas, points of view or imaginary scenarios of m-Learning usage. The questions were split into thematic groups, like “Availability of devices”, “E-Learning Usage”, “Opinion about m-Learning”, “Opinion about prices” and etc.

2. OUR FINDINGS

Part of the questionnaire covered different aspects of the e-learning. As one of the independent variables of our investigation is the current use of e-Learning, one of the initial questions to which the students had to answer was “Do you use e-learning platforms (computer supported/mediated learning)”. They were given the option to choose between three answers: Yes, only the platform of the University; Yes, different platforms/systems; Don't use e-learning. The results are shown in Table 2 below.

Table 2: Do you use e-learning platforms?

Answers	BG	IT
Yes, only the platform of the University	46.6%	43.5%
Yes, different platforms/systems	26.3%	20.6%
Don't use e-learning	26.9%	35.8%

The results show that almost equal percentage of students from University of Rousse and University of Trento use the

corresponding university e-Learning platform. At the University of Rousse this is the eLSe platform [5]. The percentage of the students which use more than one e-Learning platform is almost equal also. The percentage of the Italian students which don't use any e-Learning platform is slightly higher (35.8% vs. 26.9%). One reason for this result is that many students from the University of Trento prefer traditional lectures and discussions with teachers than the new educational methods. The other reason is connected to the availability of sufficient number of learning materials for different subjects in the e-Learning platforms of the two universities.

To define how the independent variables influence on the students' expectations about m-Learning the survey includes the following questions – if the students used such systems previously; if they are eager to use one; what functionalities in their opinion has to be supported by such platform and etc.

On fig.1 are presented the results from the students' answers of the question "Have you used mobile learning (m-Learning) before?".

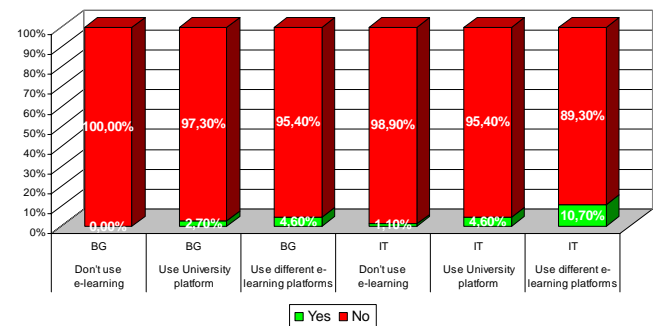


Figure 1: Have you used mobile learning (m-Learning) before?

The respondents are categorized according to two independent variables – country of residence (Bulgaria or Italia) and the use of e-Learning. The tendency of the answers of this question shows that the percentages (regardless that are low) increase according to the students' e-Learning habits. The lowest is for these students which do not use e-Learning and the highest is for the students which have been using several platforms. The comparison of the answers given by the Bulgarian and Italian students shows that in Trento twice more learners have ever used an m-Learning system. The reason for this difference could be the higher finance incomes of the Italian students. Thanks to this they might own more technological gadgets and mobile devices than Bulgarian students and might experiment with them.

The answers of the second question “Would you like to use mobile learning (m-Learning)?” (fig.2) shows the same tendency as the answers to the first question. The highest interest to use m-Learning is shown by those students that have used several e-Learning platforms. The lowest interest is among students which haven't used e-Learning. From these results we might deduct that the students which use the new technologies and are more familiar with the new educational forms are more disposed to use mobile learning. In this question, however, one can see that the eagerness of the Italian students is lower than the one of Bulgarian participants. The reason is the preference of the Italian students

for face-to-face lectures, a trend that can be seen in the free-text answers in our questionnaire [10].

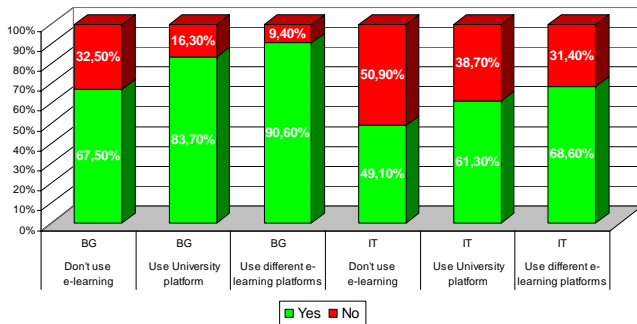


Figure 2: Would you like to use mobile learning (m-Learning)?

The answers of the third question “Do you think that the usage of m-Learning will increase the quality of instruction?” (fig.3) are also interesting.

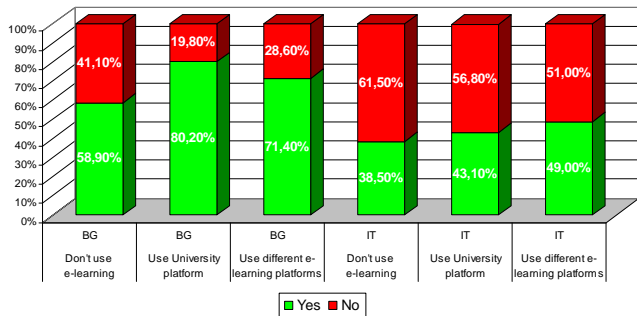


Figure 3: Do you think that the usage of m-learning will increase the quality of instruction?

The results from the three groups show that more Bulgarian than Italian students consider that the mobile learning will increase the quality of education. Among the learners from the University of Rousse most optimistic is the group of these students which use

only the university e-Learning platform. For the students from the University of Trento most positive is the group of learners which use several e-Learning platforms. The reason for these answers should be behind the question of where the students find enough information to support their learning - weather only in the university e-Learning platform or they must use additional sources.

The forth question in the survey concerns the students’ opinion about what learning related services they find useful to use mobile devices. Table 3 presents the answers of this question of the Bulgarian and Italian students in dependence of their utilization of e-learning.

The analysis shows that the use of e-learning platform and the country do not have a very big influence on what the students think the mobile technology is useful for. All students from Bulgaria and Italy, from any e-Learning usage group, almost at equal degree expect that the mobile devices must have a possibility to access supporting educational information via Internet. The students also consider that the mobile devices must support the communications between the students and teachers. The reasons for these answers are probably the students’ need to access information (schedulers, exams results, etc.) at any place and any time, and that they use their own mobile devices usually for a communication.

The answers of the fifth question “What is in your opinion the prospect of an m-learning system?” are given in Table 4. Students expect that the mobile learning system has to be used to support the traditional learning. The percentage of the learners that expect the mobile learning systems to be used as autonomous educational system is small in all groups. However, this viewpoint is strongest for the students which use several e-Learning platforms. The percentage of the learners which think that mobile learning has no future is also low and is supported stronger by the students which haven't used e-Learning till now. This group of learners also shows highest percentage of answers "I don't know".

Table 3: For which of the following do you find useful the usage of mobile devices?

Answers	Don't use e-learning		Use University e-learning platform		Use different e-learning platforms	
	BG	IT	BG	IT	BG	IT
To access educational content online	6.8%	12.3%	12.5%	12.4%	10.6%	11%
To access educational content off-line	3.1%	5.4%	5.8%	6.5%	6.9%	7.8%
To access supporting educational information (e.g. schedulers, exams results) via WWW	17.2%	19.2%	14%	18.2%	12.3%	15.8%
To receive supporting educational information via SMS/MMS on demand/request	8.3%	9.1%	11.3%	12.1%	9.8%	11.6%
To receive supporting educational information via SMS/MMS always	8.9%	3.4%	5.1%	5%	8.6%	4.2%
To communicate with other students	15.1%	11.9%	13.4%	10.4%	12.3%	10%
To collaborate with other students	9.9%	7.2%	8.8%	7.6%	10.2%	8.8%
To communicate with teachers	16.2%	15%	14%	13.2%	13.5%	13.2%
To fill-in tests and questionnaires for exams	6.2%	9.7%	6.7%	8.4%	6.9%	9%
To fill-in tests and questionnaires for self-assessment	7.8%	6.2%	7.9%	5.7%	8.2%	8.2%

Table 4: What is in your opinion the prospect of an m-learning system?

Answers	Don't use e-learning		Use University e-learning platform		Use different e-learning platforms	
	BG	IT	BG	IT	BG	IT
As an autonomous educational system	2.3%	9.8%	5.5%	7.4%	9.3%	10.7%
As a support system for the traditional forms of instruction	64.2%	58.7%	75%	68.6%	83.7%	62.7%
It has no perspectives	9.5%	12.2%	6.9%	10.7%	0.0%	8.8%
I don't know	23.8%	19.1%	12.5%	13.0%	6.9%	17.6%

In 2004 at the University of Rouse a similar investigation among 102 students from different courses and specialties was made [4]. Following, we show side by side the answers given by the students in 2004 and 2005 respectively. The results from two of the common questions: "Do you use e-learning platforms?" and "Would you like to use m-learning?" are presented in Table 5 and Table 6.

Table 5: Do you use e-learning platforms?

Answers	BG - 2004	BG - 2005
Yes	58.8%	73.0%
No	41.2%	27.0%

The analysis of the results from Table 5 shows that the positive answers have increased with more than 14% within one year. The main reason for this is that during the last year the quantity of learning material in the university's e-Learning platform is increased significantly and thus more students' educational needs are satisfied.

Table 6: Would you like to use m-learning?

Answers	BG - 2004	BG - 2005
Yes	74.5%	81.6%
No	25.5%	18.4%

The results display that the percentage of students which would like to use m-Learning has increased with 7% during last year.

The increasing percentage of students that use e-Learning leads up to growth of the percentage of those that would like to use m-Learning (fig.4).

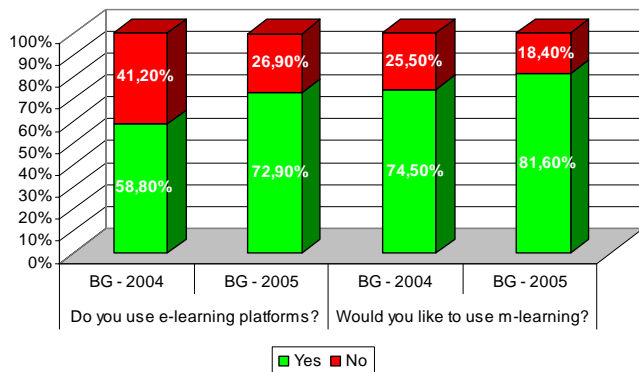


Figure 4: Comparison of the students' answers given in 2004 and 2005

To define how the fourth independent variable - ownership of mobile devices - influences on students' expectation about m-Learning the study also includes some questions about the students' ownership of mobile devices. The answers of the question "What device do you have?" from the 2004 and 2005 questionnaires are shown on fig.5.

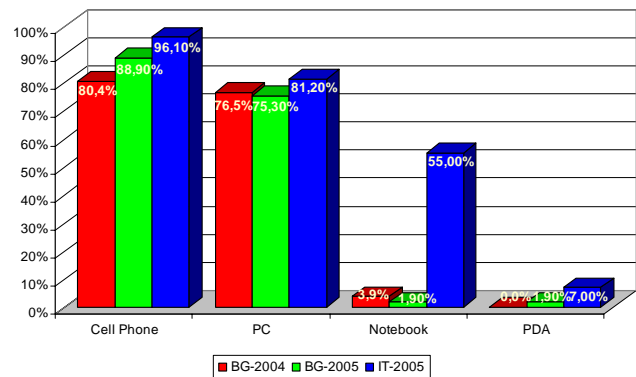


Figure 5: Students' ownership of devices

An important observation is that the percentage of the students which have cell phones in Bulgaria increased in 2005 in comparison with 2004. On the figure the 2005 results for Italian students are also presented.

The results show that recently almost every student possesses a cell phone. This is valid both for Bulgarian and Italian students. At the same time there is no essential change in the ownership of personal computers, Notebook computers and PDAs. The portable devices are not widespread between Bulgarian students. Though about half of the Italian students possess a notebook, relatively low is the percentage of those who have a PDA device also in Italy.

These results differ vastly from the data presented in Table 1 especially about the ownership of PCs. The difference for Bulgaria is 12 times and for Italy is 3 times. The reason for this difference is that the students use much more ICT than the typical citizens of these countries. The possession of cell phones from Bulgarian students is almost the same as the results from 49 students from Ireland, Norway and Hungary involved in another survey [7] where the percentage is 86. The results for Notebook and PDA ownership from Italian students like the results presented in [9] where the average percentage for Notebook possession is 50 and the percentage for PDA is 11.

In m-Learning the devices that are generally considered by the researchers and developers for a main tool are mobile phones and

PDA devices. However one can see that the ownership of PDA types of devices between the university students is very low and in addition it increases slowly with the years. At the same time the positive attitude to m-Learning (shown on fig.2) increases. This might be interpreted as a sign that from students' view point the better (and cheaper) choice for m-learning device is the cell phone. This result differs from other survey [14] where the smart phones have the highest potential to be used in on-line m-Learning. Probably with the new more sophisticated models of cell phones the difference between cell phones and smart phones will disappear and the students will use smart phones (cell phones with PDA abilities) for mobile learning.

3. CONCLUSIONS

The paper presents the results of a study on the influence of e-learning usage on the students' opinion and attitude to mobile learning. The analysis of the results shows that the students' usage of e-Learning increases their interest to m-Learning. In our opinion the correlation is more between the students' broader interest to use new technologies for their study processes and also the necessity to access additional learning materials (apart from the ones presented in face-to-face lectures). As our dynamic life requires knowledge to be acquired even after finishing the formal university education these conclusions can be generalized for wide user group, outside the universities, which makes the m-Learning an important tool for lifelong learning.

4. ACKNOWLEDGMENTS

We thank to Prof. M. Ronchetti and to other involved personnel at the University of Trento for the organizational and administrative support in the realization of the Italian part of the survey.

We also thank to the involved personnel at the University of Rouse for their assistance to the implementation of the Bulgarian part of the survey.

5. REFERENCES

- [1] Attewell, J., Mobile technologies and learning, 2004, [www.m-learning.org/docs/ The m-learning project – technology update and project summary.pdf](http://www.m-learning.org/docs/The_m-learning_project_-_technology_update_and_project_summary.pdf)
- [2] Dye, A., Testing of an “always-online mobile environment”, 2005, [learning.ericsson.net/mlearning2/ files/workpackage6/testing.doc](http://learning.ericsson.net/mlearning2/files/workpackage6/testing.doc)
- [3] Dye, A., What do students think of mLearning?, 2005, learning.ericsson.net/mlearning2/ files/conference/adye.pdf
- [4] Georgiev T., E. Georgieva. Preconditions for Using m-Learning at the University of Rouse. Proceedings of the International e-Learning Conference, Brussels, Belgium, 7-8 Sept. 2004, pp.3.4.1-3.4.13
- [5] Hristov, T., A. Smrikarov, T. Georgiev. A New SCORM Conformable Architecture of the E-Learning Shell (eLSe) Software Platform. Proceedings of the International e-Learning Conference, Brussels, Belgium, September 7-8, 2004, pp.2.3.1-2.3.8.
- [6] Jinwoo, K., Analyzing Mobile Internet Users: Results from a monitoring study, an experiment, and a survey study, www.cs.colorado.edu/~palen/chi_workshop/papers/kim.pdf
- [7] Keegan, D., Mobile Learning: The Next Generation of Learning, 2005, [http://learning.ericsson.net/mlearning2/files/workpackage5/ book.doc](http://learning.ericsson.net/mlearning2/files/workpackage5/book.doc)
- [8] Roberts, J. et al, Harvesting Fragments of Time - Mobile Learning Pilot Project, 2003, www.mcgrawhill.ca/college/mlearning/mlearn_report.pdf
- [9] Sharples, M., M-learning - Putting the m and the learning together, 2004, <http://www.ucisa.ac.uk/events/2004/conference/papers/1-sharples.ppt>
- [10] Trifonova, A., E. Georgieva. Determining the Readiness for Mobile Learning. Technical Report UNITN-2005-09-15, Informatica e Telecomunicazioni, University of Trento, August 2005. Available online at <http://eprints.biblio.unitn.it/archive/00000874>
- [11] Valentine, E., Unplugged Learning: A report on the rise of mobile technology in learning, 2004, <http://cms.steo.govt.nz/NR/rdonlyres/6C03C DFA-70E7-4179-90E5-7637BA267D7C/0/ UnpluggedLearningFinalNovember04.doc>
- [12] Basic indicators, http://www.itu.int/ITU-D/ict/statistics/at_glance/basic05.pdf
- [13] Cellular subscribers, http://www.itu.int/ITU-D/ict/statistics/at_glance/cellular05.pdf
- [14] Epic Survey 2003: The future of e-learning, http://www.epic.co.uk/content/resources/white_papers/ Epic_Survey2003.pdf
- [15] Information technology, http://www.itu.int/ITU-D/ict/statistics/at_glance/Internet04.pdf
- [16] M-Learning in a Technology-Rich Environment, ceres.cals.ncsu.edu/cfdocs/academic/pda_initiative.pdf
- [17] Mobile Phones and Youth: A Look at the US Student Market, 2004, <http://www.itu.int/osg/spu/ni/futuremobile/Youth.pdf>
- [18] Statistics for Mobile Commerce, <http://www.epaynews.com/statistics/mcommstats.html>
- [19] Student Evaluation of the “Contemporary Hungarian Art” course at the Corvinus University of Budapest, 2005, [learning.ericsson.net/mlearning2/ files/workpackage7/corvinus_evaluation.doc](http://learning.ericsson.net/mlearning2/files/workpackage7/corvinus_evaluation.doc)
- [20] The 2006 e-readiness rankings, A white paper from the Economist Intelligence Unit, 2006, a330.g.akamai.net/7/330/2540/20060424215053/ graphics.eiu.com/files/ad_pdfs/ 2006Ereadiness_Ranking_WP.pdf
- [21] University of Rouse, <http://www.ru.acad.bg>
- [22] University of Trento, <http://www.unitn.it>