A Survey on Usage of Mobile Devices for Learning among Tertiary Students in Croatia

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Abstract. *For the past few years we are witnessing the explosion of mobile learning (m-learning) at all levels of education.*

This paper presents characteristics and elements of mobile learning and identifies researches about usage of m-learning in higher education practice. Then it presents results of a web survey conducted among convenience sample of students enrolled into Croatian tertiary education institutions about their usage of mobile devices for learning, and their attitudes about m-learning in general. Research results have shown that there are differences in frequency of usage of m-learning activities on a smartphone compared to the activities used on a tablet.

Keywords. Mobile learning, m-learning, higher education, survey, smartphone vs. tablet

1 Introduction

In the last twenty years a great number of educational materials become available on the internet: books, scientific researches, presentations, video tutorials, educational games etc. With introduction of social networks, online interaction between people has increased, enabling learners to comment and collaborate on educational topics as well. Development of learning management systems (LMSs) has led to the embracement of new technologies and e-learning environments in the schools and at the universities.

Now we are witnessing the explosion of mobile learning (m-learning) in all fields of education. Mobile learning allows students acquiring their learning materials anywhere and anytime using mobile technologies and the internet.

Definitions of mobile learning are numerous. O'Malley defines mobile learning as a learning that happens when students are not on a fixed location, or a learning that happens when students use learning possibilities of mobile technologies [7]. Other definition describes m-learning as learning through different contexts, through social and content interactions, using personal electronic devices. Context in this definition means learning that is "formal, self-directed and spontaneous" [4].

There are some differences when comparing m-learning with e-learning. Mobile learning allows learning "on the go", while e-learning demands a classroom, a computer lab or a place for a computer with the internet connection to attend or hold the lecture. In instructor to student communication, mobile learning allows instant, synchronous and spontaneous communication, while with e-learning there is a time-delayed, passive and asynchronous communication. Mobile learning enables taking assignments and tests at any location, independent of in advance agreed time, E-learning, on the other hand, demands dedicated time of taking the tests, standard tests and restricted amount of time to answer the questions, with usually delayed feedback [10].

There are several research studies that have investigated how mobile learning is integrated into formal learning environments in higher education, e.g. in Austria [11], Iran [13] or China [16]. Since educational system and economic status of the aforementioned countries differ from those in Croatia, we found beneficial to explore current state of mobile learning among Croatian students, in addition to the researches conducted in 2007 and 2010 [2].

In this paper we present research results of a survey conducted among students enrolled into Croatian universities, polytechnics and colleges about their usage of mobile devices for mobile learning activities. An analysis of research results has indicated there are differences in using a smartphone and a tablet for particular m-learning activities. Students' attitudes towards some aspects of m-learning are also explored and presented in the paper.

2 Characteristics of Mobile Learning

Mobile learning has various characteristics. There are general characteristics that include technical

aspects of m-learning like accessibility or portability, and characteristics that include pedagogical aspects of m-learning. The following characteristics describe nature of m-learning applied in the formal learning settings:

- Place – Mobile learning is not tied to a classroom or course schedule. Students can learn in the field or on the move (in a bus, train, coffee bar) [10].
- Ubiquity – M-learning is more spontaneous than any other type of learning since students can learn anywhere and anytime. Spontaneity is probably one of the most recognizable m-learning characteristics [12].
- Portable size of mobile tools – Tools for mobile learning are small and portable so students can use them anywhere during their study time [12].
- Instant information accessibility – Usage of mobile tools enables possibility of instant sending and receiving information [10], [12].
- Privacy – Only one student at a time has access to the mobile tool and the course content [12].
- Pedagogical change – Regarding learning methods more voice instructions, graphical elements, video and animations are used in mobile learning [10].
- Blended learning – Mobile learning can be combined with classroom learning. Mobile tools can be used for writing homework, projects or research [12].
- Communication and interactivity – Students actively participate in class, discussions and in their own learning. Communication between students and teachers is active, synchronous and asynchronous, also rich and spontaneous. Student to student communication is flexible, video and audio teleconferences are possible [10], [12].
- Collaboration – Mobile technologies enable students to work in groups and share their ideas [12].
- Feedback to student – Feedback to students is possible on one-to-one basis and is available both synchronous and asynchronous. Grading is based on students' performance and improvement [10].
- Assignments and tests – Online tests and assignments can be taken at any location that has an internet access, with any amount of time possible. Test can be adapted to student's specific needs and grade feedback is instant [10].
- Presentations, exams and assignments – Presentations can be monitored from remote location, assignments can be delivered at any place and time and exams can be practically oriented direct on site [10].

2.1 Technologies for Mobile Learning

Nowadays many students possess a smartphone or a tablet and use it for numerous everyday activities: communication, web browsing, tweeting, status sharing, video watching, recording or uploading, task scheduling or mobile gaming. Mobile technologies are attractive and easy way to maintain literacy skills and gain constant access to learning materials.

Mobile devices and technologies that can provide support for mobile learning are [10]:

- e-books,
- handheld audio and multimedia guides,
- gaming consoles,
- personal digital assistants (PDA),
- tablet computers,
- mobile phones, smartphones.

Characteristics of aforementioned mobile devices are their small size (small enough to be handheld), they are lightweight (they weigh less than a kilo) and have a display screen with touch input or a small keyboard. Laptops are not usually considered as mobile devices since they are too big and too heavy to be easily used while traveling or walking.

There are several basic requirements that technologies for mobile learning should incorporate or characterize [10]:

- High portability: Students can always carry mobile devices with them and use them whenever they need to learn.
- Individual: Technology should suit to learner's needs, individual abilities and knowledge.
- Unobtrusive: Student can learn in any situation without technology being overly noticeable.
- Available: Student can use technology anywhere.
- Adaptable: Technology can be adapted to the context of learning and to student's skills and knowledge.
- Persistent: Student can use technology for learning and specialization during whole life.
- Useful: Technology is adequate for everyday use, for example for communication, learning and work.
- Easy to use: Technology should be easy to work with and is easily comprehended.

There are also several technical challenges that influence on usage of mobile devices for educational purposes. Those can be seen as negative aspects of mobile learning:

- Device variability – It is difficult to implement modules of mobile learning on every possible mobile device since students possess diverse mobile devices [5].
- Connectivity issues – Despite of improvement on a field of mobile broadband connectivity, broadband access is still expensive or even unavailable for some regions. Also, there is an integration issue between the hardware and the software of the device [1], [5].
- Small screen sizes with poor resolution, color and contrast – Because of small screen students can accidently select a function they don't need, e.g. delete document [1], [5].
- Limited memory – Mobile devices have limited memory storage and RAM. Memory can be added to a device from external memory sticks or

cards but cannot be embedded in some older mobile devices [5].

- Battery life – Every activity on a mobile device waste a battery life, whether this activity is associated with learning or something else [1].

Besides of technical challenges, mobile learning is also facing some other issues. One of them is the cost of mobile devices and required software [10] since ownership of the mobile device is one of the critical success factors to adopt m-learning [1]. Copyright of learning materials [10] and issues of security and privacy [1] are also of a great importance when introducing m-learning into learning environment.

2.2 Elements of Mobile Learning

Basic elements of mobile learning are students, teachers, environment, content and assessment [12]. All the elements of mobile learning are mutually linked and each of them has influence on final outcome of mobile learning.

According to Makoe [9], students are in the center of all activities of mobile learning and all other elements are here to help student. Mobile learning is based on learner's interests, experiences and needs. By applying mobile learning, students have more control over their own learning but they are also responsible for the learning process, from defining their goal to the evaluation of the learning process [9]. Prior experience with technology is very important in accepting mobile technology as a learning tool. Students need to be confident in their ICT skills and they need to understand technology. As pointed out in [8], experienced students will be more comfortable and more able to use mobile technology for learning activities than those with low mobile experience.

Implementation of technology in education has changed the role of an average teacher as well. According to Ghaln (cited in [12]) a teacher's role has developed from the one of a domain expert, through the knowledge presenter to the moderator of the content in the internet era. Mobile technologies expanded the role of the teachers and they are becoming consultants [12]. Nowadays teachers need to assist their students so they could develop their full potential [9]. In mobile learning teachers have to be qualified to use mobile tools and technologies as well as the students. In teaching process, teachers need to define pros and cons of used methods and study to resolve cons with various methods. They have to adopt new teaching skills, learn with their students, advise them, increase their motivation, organize activities which support interaction between students and organize activities for evaluation of process. The use of mobile learning is also incorporated into UNESCO ICT Competency Framework for Teachers updated in 2011 [15].

Environment is a place where students get learning materials and other information. Students that study online should have an access to all learning content and be acquainted with learning outcomes, assignment requirements and relevant resources. Also, environment has to increase interaction between students and students and the teacher and it has to be available for all mobile devices [12]. In order to easily communicate with their teachers and their colleagues, students need a permissive environment [9].

Content in mobile learning should be supported with graphics and other multimedia elements. It can be presented through interactive quizzes and games. Educational content for mobile devices can be divided into three categories: HTML content, video content and audio content [13]. For example Croatian application for learning letters, Slovarica, and application for learning numbers and basic math operations, Matematički vrtuljak, are examples of mobile games with multimedia elements used in preschool and primary education context [6].

Student's assessment in mobile learning should be made via database logs, online exams, forums, online quizzes or project evaluation. Grading should help students to clear all the doubts they have about the course and at the same time learn more about the course content [12].

3 Reviews of Other Research Studies

Several researches had been conducted with the goal to find out how mobile technologies influence students' learning. In this chapter three international researches and one domestic are presented.

One of the researches is a study of using mobile devices to support learning of university students at Islamic Azad University of South Tehran [13]. Study was carried out during academic year 2011/2012 on 284 students who have been randomly selected among 2140 students of Psychology and Educational Science at aforementioned university. That particular study showed that the most frequent use of mobile devices for educational purposes by university students are activities which include using calculator, sending/receiving educational SMS and dictionary use. Activities which were rated very low were: usage of the internet for educational purposes (22.2% students used it very little and 31.7% not at all), usage of educational software (23.0% students used educational software on their mobile phone very little and 30.4% not at all), and sending/receiving educational e-mail (40.1% students didn't use that activity at all). On average, 24.4% of students didn't use mobile phone for any educational activity. Study also showed that female students, in comparison to their male colleagues, are more likely to use mobile devices in educational purposes [13].

Another study was about impact of mobile learning on students' learning behaviors and performance. The study was carried out at Network Education College, Shanghai Jiaotong University, among 178 students [16]. One hundred and forty-

three students participated in activities of mobile learning, of which 89 students participated in all activities of mobile learning. That study showed that students use their mobile devices for the following learning activities: discussing course content with classmates (85% of the participants), asking classmates questions (54%), asking the instructor or teaching assistant questions (90%), answering questions from the instructor (82%), answering questions from classmates (52%), exchanging ideas with classmates about the course material (38%). Students also had some suggestions for improving the mobile learning content, for example: more discussions through emails and forums to accommodate students with special needs, the mobile learning content must have a variety of topics and formats in addition to quizzes and situational dialogues [16].

The third study describes results of m-learning implementation into university course "Introduction to Marketing" carried out in 2011 at the university in Austria [11]. Mobile learning modules of the course consisted of searching and reading the documents, communication with the peers, participating in videoconferences, and preparing project presentations and documentation. Students were given tablets so they could actively participate in mobile learning modules, but they could also use smartphones to achieve learning goals. Results of the study showed that usage of mobile learning modules has led to better student performance at the course. The authors of the study conclude that m-learning could encourage students to actively participate in course activities but it requires some flexibility on the part of the teacher and focus on benefits rather than on the restrictions and additional workload [11].

In Croatia two connected studies have been conducted in 2007 and 2010 among the students of a primary school, a secondary school and a business school [2]. Both studies employed the same questionnaire to identify types of electronic devices used among students, types of electronic and mobile services used, monthly expenses for mobile services, and types of activities used for mobile learning. A comparison of research results has discovered an improvement in the usage of many mobile services for all three student categories. For tertiary students the following mobile services and mobile learning activities have increased and significantly contribute to the improvement of mobile learning: mobile internet access, web browsing, and usage of office packages. The two activities that showed slight decrease in usage were recording of lectures with a mobile device and audio lectures playing. In additional experiment where seven tests of knowledge were conducted among the student group which used m-learning and the one who was not used it, it was discovered that mobile learning improved test results but the difference in the mean scores among the groups was not significant [2].

4 Research Method

A research described in this paper was conducted in April 2014 as a part of a graduate diploma essay on usage of mobile learning in higher education setting in Croatia. The research was carried out by means of a web survey which comprised of four groups of closed type questions and a few open type questions.

The first group of questions provided demographic data about students' gender, age and tertiary institution, and identified possessioning of a tablet or a smartphone. The second group of questions investigated usage of mobile technologies in general, while the third group of questions collected information about ways the students use mobile technologies for learning. Fourth group of questions examined students' attitude towards the usage of mobile technologies in education.

A link to an online questionnaire was forwarded to the students via several Facebook students groups in Croatia. The questionnaire was accessible during two weeks. Collected data was analyzed with the statistical tool SPSS v19.

5 Research Results

5.1 Demographic Data

In total, 461 students from 14 Croatian higher education institutions (universities, polytechnics and colleges) have started the survey, of which 346 of them were female students (75,1%) and 115 were male students (24,9%). Given that 161 911 students were enrolled into professional or university study programme in winter semester 2013/2014 [3], a response rate of only 0.28% does not allow us to make any generalization about student population based on survey results. Rather, the answers received from this convenience sample of students who possess a mobile device could be observed as identification of various m-learning activities currently implemented into tertiary education and the usage of activities among sample students.

Most of survey respondents, 352 or (76.35%), were from the University of Zagreb. Minority of survey participants were from University of Osijek (10.4%), Polytechnic of Šibenik (4.7%), Polytechnic of Rijeka (2.3%), University of Rijeka (1.5%), University of Split (1.5%), University of Applied Health Sciences (1.1%) and University of Zadar (0.2%). Students from other four polytechnics or colleges were represented with 1.6%.

Out of 461 students, 439 or 95.2% of them have indicated which faculty, polytechnic or college they attend. Most represented in the study were the students whose area of learning belongs to the social sciences (290 or 66.1%), of which 105 or 35.9% were the students that enrolled educational studies. Other students attended study programmes in engineering (52 or 11.8%), humanities (45 or 10.3%), biotechnical

sciences (15 or 3.4%), natural sciences and mathematics (23 or 5.2%) and medical sciences (14 (3.2%).

A graph presented in Fig. 1 shows a comparison between possessing a tablet towards possessing a smartphone. Much more study participants possessed a smartphone (386 respondents or 83.7%) in comparison to a tablet (86 or 18.7%). A question about ownership of a tablet (or possibility of using someone else's tablet) was the question where the biggest drop-out of survey was noticed. We might only speculate that ownership of a tablet respondents found as a prerequisite for adopting m-learning, as indicated in [1].

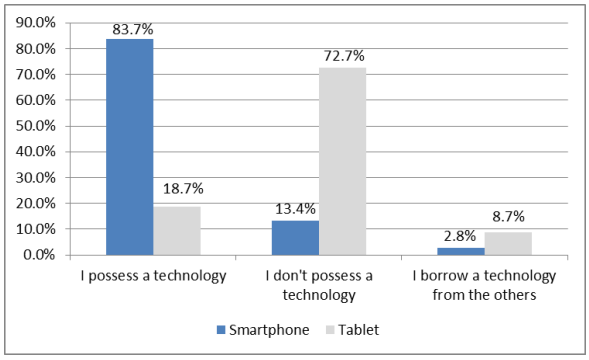

Figure 1. Comparison between possessing a tablet and possessing a smartphone

The last question in this section was selective one, about mobile devices which students use more for educational purposes. Four answers were offered: *I use smartphone more than a tablet*, *I use tablet more than a smartphone*, *I use both devices equally*, *I don't use any mobile device for educational purposes*. Out of 126 students who answered this question, 45 of them or 35.7% have indicated they do not use mobile devices for learning and consequently have finished the survey. Majority of other respondents have declared they use a smartphone for m-learning more than a tablet (47 or 37.3%), in contrast to 19 or 15.1% students who used tablets more than the smartphone or use those devices equally (15 or 11.9%). Most of the students that continued with the questionnaire were the students from social study disciplines.

5.2 Usage of Mobile Devices in General

Further analysis of survey data continued with the responses from 81 students (17.6%) who possessed either smartphone or tablet or both devices and use it for learning. Distribution of female and male students (75.3% and 24.7% respectively) was almost exact as at the beginning of the survey.

Eighty one respondents had answered to the question about a frequency of mobile device usage for web browsing in general. Answers were represented with the 5-point type Likert scale, where 1 indicated *very seldom usage* and 5 indicated *very frequent usage*. High number of respondents (56 or 69.1%) browses the web on mobile device very often, while only 5 students or 6.2% browse the web very seldom or seldom.

Respondents have indicated several types of web sites they browse and interact with on mobile devices: search engines, news portals, social networks, faculty web site, webmail, Wikipedia, faculty's learning management system, dictionaries, university information systems, shopping sites, entertaining sites etc.

5.3 Usage of Mobile Devices for Learning

The usage of m-learning was further explored with the questions about frequency of activities used for learning on the smartphones and the tablets. Usage of different activities were represented with the 7-point type Likert scale, where 1 indicated *non-usage* of the activity, 2 - *very seldom usage*, 3 - *seldom usage*, 4 - *casual usage*, 5 - *frequent usage*, 6 - *very frequent usage* and 7 indicated *non-stop usage* of the activity.

Analysis was performed on responses from 78 students who were using both the smartphone and the tablet. For clearer data visualization activities were categorized into three groups.

The first group contains activities connected to browsing, viewing and downloading of learning materials. Activity of viewing learning course materials (presentations, pdf or word documents) received the highest mean score (M=5.18, SD=1.560) on the smartphones, while on the tablets the highest mean score were achieved for the activity of downloading and saving learning materials for later use (M=4.5, SD=7.266). An activity the least frequently used both on smartphones and tablets (M=3.32, SD=1.890 and M=2.99, SD=2.092 respectively) was the activity of viewing course videos or animations developed by a teacher. A probable reason for that might lie in the fact that teachers much less develop rich multimedia learning materials in comparison to other e-learning artifacts. Distribution of activities is presented in the Fig 2.

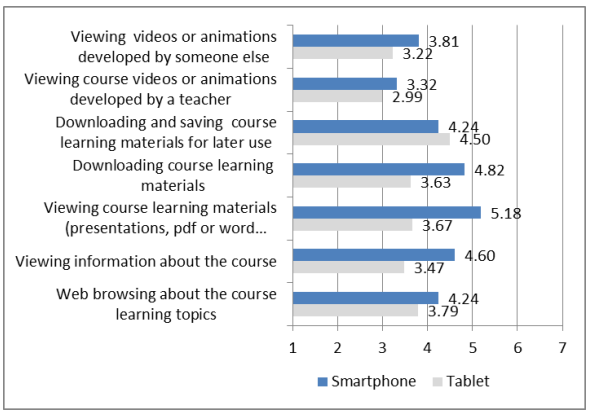

Figure 2. Mean scores of frequencies of activities connected to browsing, viewing and downloading of learning materials

In order to further explore the differences between mean scores of activities for smartphones and tablets, a paired-samples t-test was conducted. A statistically significant difference was found for the activity of viewing information about the course, which was more frequently used on smartphones (M=4.60, SD=1.847) than on tablets (M=3.47, SD=2.130; t=3.832, p<0.000, df=77), then for activity of viewing course learning materials which was more frequently used on the smartphones (M=5.18, SD=1.560) than on tablets (M=3.67, SD=2.056; t=5.267, p<0.000, df=77) and for activity of downloading course learning materials, also more frequently used on the smartphones (M=4.82, SD=1.688) than on tablets (M=3.63, SD=2.058; t=3.911, p<0.000, df=77).

The second group of activities includes those connected with mobile communication for educational purposes. Distribution of activities is presented in the Fig 3. A paired-samples t-test was conducted to evaluate differences in mean scores for smartphones and tablets. There was a statistically significant difference in frequency of usage where smartphones were more frequently used then tablets for the following activities: communication with the teacher by e-mail or LMS on smartphones (M=5.10, SD=1.584) vs. tablets (M=3.23, SD=2.107; t=7.415, p<0.000, df=77), communication with the colleagues for educational purposes using e-mail on smartphones (M=4.78, SD=1.891) vs. tablets (M=3.31, SD=2.337; t=5.579, p<0.000, df=77) and communication with the colleagues for educational purposes using social networks on smartphones (M=5.99, SD=1.525) vs. tablets (M=3.79, SD=2.467; t=7.659, p<0.000, df=77). Communication using social networks was scored with the highest frequency in comparison to other two types of communication.

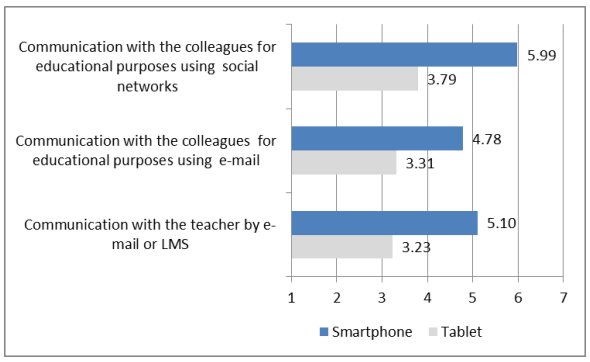

Figure 3. Mean scores of frequencies of activities connected to mobile communication

The third group of questions included other helpful activities that enhance mobile learning. Distribution of activities is presented in the Fig 4. For all three activities were found that there is a statistically significant difference of activities usage on smartphones and tablets. A paired-samples t-test has revealed that registration for course activities (e.g. lab exercises) was more frequently used on smartphones (M=3.90, SD=2.080) than on tablets (M=2.96, SD=2.060; t=3.679, p<0.000, df=77). Creation of timetable and learning plan was scored higher on smartphones (M=4.33, SD=2.062) than on tablets (M=2.88, SD=2.138; t=5.973, p<0.000, df=77). Little less significant difference was found for the activity of installing mobile application for learning specific topic, but smartphones (M=3.33, SD=1.835) once again outperformed tablets (M=2.79, SD=2.054; t=2.335, p<0.022, df=77).

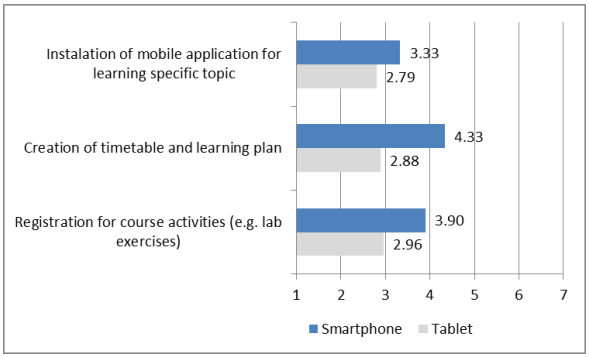

Figure 4. Mean scores of frequencies of other activities connected to mobile learning

Additional questions about frequency of activities were asked regarding creation of learning materials on tablets. All activities were scored fairly low as presented in the Fig 5.

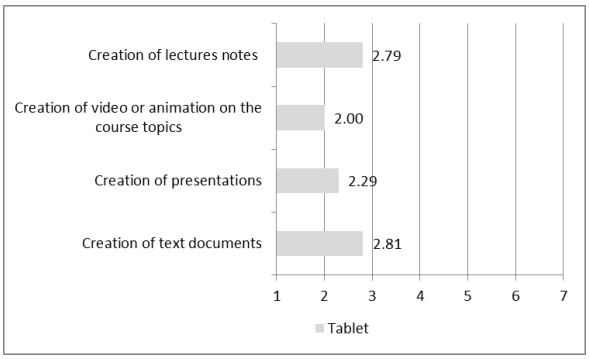

Figure 5. Mean scores of frequencies of activities connected to creation of learning materials on tablets

The mode value is 1 (*non-usage* of the activity) for all activities of material creation on the tablet. Majority of students have never created text documents (37.2%), have never created lecture notes (39.7%), have never created presentations (48.7%) and have never created video or animation on the course topics (52.6%). We might conclude that creation of learning materials on tablets presents time-consuming activity that requires appropriate skills and applications installed on mobile devices. Some of those respondents who create learning materials have indicated in the open ended question that they use mobile office packages like Microsoft Office Mobile, Kingsoft Office, Polaris Office or Evernote.

In the open ended question respondents could insert the names of mobile applications they use for educational purposes. After categorization of their answers we found out that, besides office packages, the following categories of applications were used for m-learning:

- pdf documents readers (e.g. Adobe Reader, Foxit Reader, Prestigio Reader itd),
- dictionaries (e.g. Meriam-Webster Dictionary, Oxford Dictionary of English),
- applications for learning languages (e.g. Duolingo),
- mobile ebook readers (e.g. Aldiko, iBooks),
- applications for planning learning activities (e.g. Learn on the go, Study timetable, Studomat),
- applications for accessing learning management systems (e.g. Moodle),
- applications for accessing learning materials (Dropbox, FileAppPro, Scribd)
- application for enhancing memory, concentration and learning skills (e.g. Brain Gym).

Finally, the students had to estimate time they spend on various activities of mobile learning towards the total amount of time spent on other mobile activities like conversation, playing games, texting, surfing etc. Almost half of respondents (43.2%) spend only up to 20% of time using mobile device on learning and the similar percentage of them (40.7%) spend up to 40% of time on m-learning which might suggest that m-learning is still not broadly accepted.

Survey results show that students don't use wide possibilities of mobile learning, particularly on the tablet. One potential disadvantage of using m-learning refers to many distractors that can drag away learner's attention. In this study, 52 students (64.2%) indicated that they often or very often wander away from educational materials while they are using them on mobile devices.

5.4 Attitudes about Mobile Learning

The last group of several questions examined students' attitudes towards using mobile devices and technologies in education. Answers were represented with the 5-point type Likert scale, where 1 indicated *strongly disagree* and 5 indicated *strongly agree.*

As seen in Fig 6. many students would like to receive text message to their mobile device about their obligations and task/project deadlines. Also, many students (38 or 46.9%) answered that they don't have to print out learning materials because they can learn from mobile device, while 24 students (27.1%) can't learn from materials that are stored on mobile devices.

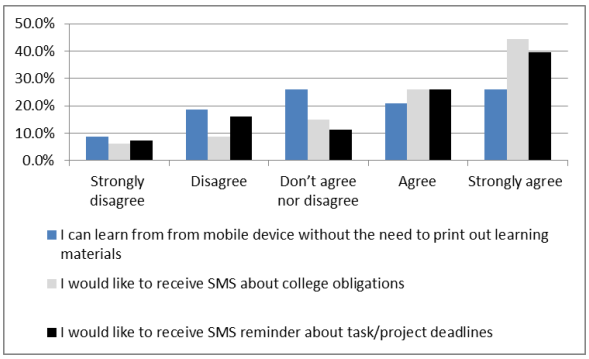

Figure 6. Attitudes about m-learning

Students were also asked how much the usage of mobile technologies has helped them in learning. Most of respondents have indicated that m-learning has helped in their learning much (36 or 44.4%) or very much (17 or 21.0%). According to their positive answers, we can assume that m-learning has a bright future in Croatia. This was also confirmed by the respondents' next answer where 79.0% of them declared that mobile learning is the future of education. However, they think (54.6% of them) that mobile learning cannot be a replacement for traditional learning.

6 Conclusions

In this paper results of survey on usage of mobile technologies and m-learning activities among Croatian university students are presented. Results indicate that mobile learning in Croatia is taking place and some m-activities can be compared to mobile learning in other countries. High percentage of students possess smartphones (83.7%, N=461), while tablets are not so common (27.4% students own or can borrow a tablet).

Still, mobile devices are not used for learning to a great extent and non-usage of mobile devices for educational purposes (35.7%, N=126) are greater than in Iran where 24.4% of students at the University of Islamic Azad didn't use their mobile phones for any educational activity [10]. However, one should have in mind that respondents sample in our study had more diverse student population coming from 14 higher education institutions.

Similarly, on Shanghai Jiaotong University 90% of students use mobile devices for communication with instructors and teachers [14], which is much higher than 44.4% of students in our study who use their smartphones for the same activity.

This study has explored various m-learning activities and their usage on smartphones and tablets. In order to identify differences in activities performed on these mobile devices, a paired-samples t-test was conducted. Out of 13 m-learning activities, for 9 activities there was a statistically significant difference in frequency of usage on smartphones,

which outperformed tablets. This might suggests that study participants prefer smartphones over tablets or possibly are not very familiar with functionalities and benefits of using tablets.

Overall, 79.0% of study participants think that mobile learning is the future of education, but they also agree that mobile learning can't replace a teacher in the classroom.

Although this research results cannot be generalized due to limited and non-representative sample size, our study sheds lights on possible directions of mobile learning developments in Croatia. The study revealed that students are technically equipped to use m-learning, which was also discovered in [2], and that they use mobile devices primarily for viewing, downloading and saving learning materials. Web browsing for general purposes is the most popular activity, as also found in [2]. Communication for educational purposes is also highly ranked among m-learning activities. Thus, the next steps would be to encourage usage of advanced m-learning activities, e.g. creation of learning materials that are adapted for small screen sizes, as well as education of both students and teachers to explore benefits of m-learning and integrate it into formal education.

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