Example of personalized m-learning mathematic class ("mobile learning")

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Abstract:

The new technology includes multimedia-equipped mobile phones, personal digital assistants (PDAs) and pen tablet computers; the new emphasis in education is on supporting the learner, in collaboration with peers and teachers, through a lifetime of education, both within and outside the classroom. This new area of personal mobile learning is distinctively different from learning within schools and colleges, and from the traditional notion of continuing education, with its emphasis on equipping people with the skills and knowledge for a rapidly changing society. It also brings with it a need to re-conceptualise the interaction between learning and the design of mobile technology.

Introduction

Information on hand

In the last few years we have witnessed the fast development of telecommunication devices equipped with significant multimedia abilities. It has never been possible to unite so many different functions in one portable device as it is nowadays, in handheld computers, mobile phones or multimedia reproductors. At the same time, the data storage memory capacity provides for numerous different applications of devices. The connectivity capabilities, between the devices and towards the Internet provide a fast and good data transfer via different protocols.

These technical features opened the door to the practical application of mobile education – we can say that the new era of mobile learning is ahead of us. O'Malley defines mobile learning in the following way: "Any sort of learning that happens when

the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of learning opportunities offered by mobile technologies" (O'Malley et al., 2003).

Mobile learning is also called m-learning. In order to answer the question what m-learning is, and is it a derivative of e-learning or a related word, it is important to establish what is more important for the definition of this word – a little personal communication device, a subject of m-learning or is it about a new approach to the delivery, cooperation and other elements of educational process.

One of the approaches to the definition of this word would be that m-learning is actually the use of any device or technology which is surrounding the subjects of educational process in an effort to enrich and improve their learning through existing and online content.

It enables 'information on demand", access to information regardless of the place where you are and whenever you want. This concept of learning was a breaking point in online education, which was so far limited to the web-based or virtual classrooms.

We are no longer asking ourselves if the mobile learning is feasible, we are now pondering over whether it can be efficiently incorporated into an educational program. Laurillard (2007, pp. 156–157) defines mobile learning as 'digitally-facilitated site-specific' learning, and she considers it to possess a degree of inherent motivation because of the degree of ownership and control afforded. Although, lately numerous discussions were led on negative aspects and the consequences of the technology we are using, we sometimes forget all the good things the information technology brought to many fields, and especially in the educational field. Primarily, we are talking about m-learning, or the uses of modern information and communication technologies in the learning process.

The research on students' perception on mobile devices in learning was conducted by the Faculty of Electrical Engineering and Computing, University of Zagreb, within the scientific project "Computer assistance to the education", in cooperation with the National Institute of Education, Singapore, under the title "Leveraging Mobile Technology for Sustainable Seamless Learning".

Comparing the attitudes of students on mobile devices in learning, the Dependent T-test for paired samples established the positive changes in attitude toward the use of mobile device in the classroom.

Use of mobile applications, September 2009 – January 2010

Survey question		ẋ	Std.Dev.	t
Mobile device is helping me with learning in the classroom	Survey Feb 09	1,46	,643	-2,765
	Survey Sept 09	1,82	,451	
Mobile device is helping with learning outside the classroom.	Survey Feb 09	1,42	,683	-2,321
	Survey Sept 09	1,76	,490	
I like the learning activities when assisted by a computer and computer devices	Survey Feb 09	1,05	,223	-2,016
	Survey Sept 09	1,23	,536	
I learn more when working in a group than alone.	Survey Feb 09	1,37	,633	-2,634
	Survey Sept 09	1,68	,662	

M-learning and learning through play

What does m-learning look like today in practice? There are numerous examples of teachers in the world who have made audio and audio and video recordings of their classes. Reproduction and downloading of this content does not pose a special problem for modern communication devices, and the users are grateful for the fact that they can work on their education while, for example, using the public transportation, waiting in line or doing something else. iPad and smart phones have provided with the new dimension of learning. Some of the most popular applications that can be used for learning are as follows: Dictionary.com – translation, WORLD WIKI (Detailed information on more than 200 countries), Ever note Data and notes organizer ,Google earth, Math drills lite..

Not only it is possible to listen the lectures, but mobile devices enable the cooperation with the peers on solving group assignments, or answering the questions and solving the problems, as well as creating and delivering various documents to the examiners.

5 advices for implementation of m-learning (Economides & Nikolaou – Evaluation of handheld devices for mobile learning):

1. Keep it short and simple
2. Low Information Density
3. Easy with the Multimedia
4. Include Elements of Collaboration
5. Provide Tools (Applications) and Not Just Content

Characteristics of m-learning

Mobility – the 'anytime, anywhere' capabilities of mobile devices encourage learning experiences outside of a teacher-managed classroom environment. Inside the classroom, mobile devices provide students with the capabilities to link to activities in the outside world that do not correspond with either the teacher's agenda or the curriculum (Sharples, 2003). Both scenarios present significant challenges to conventional teaching practices. Therefore, students are able to implement the experience learning in everyday life, including the curiosity and innovation of experience.

Klopfer (Klopfer et al, 2002) identify five properties of mobile devices (PDAs in this case) that produce unique educational affordances:

- **Portability** – the small size and weight of mobile devices means they can be taken to different sites or moved around within a site.
- **Social interactivity** – data exchange and collaboration with other learners can happen face-to-face. Nyiri (2002), with reference to Dewey's emphasis on the need to facilitate face-to-face interactions, posits a new philosophy of mobile learning that points to mobile technologies as facilitators for the innate anthropological need to communicate.
- **Context sensitivity** – mobile devices can both gather and respond to real or simulated data unique to the current location, environment and time.
- **Connectivity** – a shared network can be created by connecting mobile devices to data collection devices, other devices or to a common network.

- **Individuality** – scaffolding for difficult activities can be customized for individual learners.

Methodic

Suggested way of classroom and learning units formation, i.e. addition to the learning content, is designed as the personalized approach to the teaching of mathematics. Learning contents are encompassed and adjusted to the mobile learning, and therefore available to all students as an approach to the lesson which is, at the moment and according to their individual reasons, in student's focus, regardless of their age or school grade. Learning content of mathematics is methodically designed in such way that the students can, in accordance to their individual needs, choose the optimal way of learning.

Students can access such learning unit, divided into lessons, on a mobile device. Such approach to the mathematic learning content is demanded by students who are unable to access the computer, but also the children who attend many extra curriculum activities. Therefore, it is necessary to provide approach to learning content via the media which can be as mobile as the student. "Mobile learning" is a justifiable name for the way of learning where learning contents become available to every student regardless of their whereabouts, or the moment in time they decide to learn or study mathematics.

Learning units and introduction into the learning concept are realized in Moodle system, which is based on open code, and intended for development of electronic educational content and implementation of distance learning. Every learning unit is designed in such way that along the basic explanation of the key words, there is also a video of the teacher explaining the content. Video material is made in the classroom environment. Besides, students practice learning contents through didactic and interactive games. Students can check on the level of acquired content by solving a mathematic problem at the end of the lesson. The result of the problem can be checked by watching the video clip of the teacher solving the same problem.

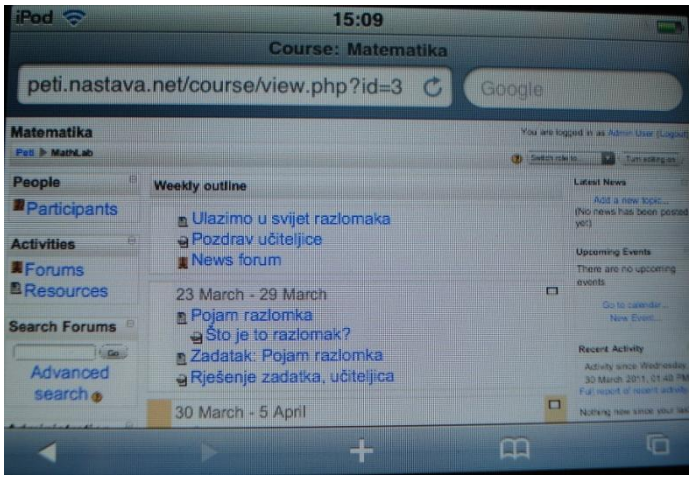
M-learning designed teaching becomes personalized by the way the students approach the learning contents, where students choose which contents they will learn and in which way. At the same time, the course of learning is not determined by

a traditional methodic form. Whichever was the reason for which the student decided to use this way of learning the offered learning content, he is able to choose his own way of learning, adjusted to his own needs.

Each mathematic lesson is divided according to the same methodic model: 1.) theory, 2.) video clip of the teacher in the classroom, 3.) mathematic problem, 4.) solving the problem – video clip with the teacher in the classroom 5.) interactive play, and in that way provides the student with the possibility to study certain mathematic content in various ways and methods.

Suggestion of the methodic model of personalized m-learning mathematic class:

1.) theory



2.) video-clip of the teacher in the classroom

3.) mathematic problem

4.) solution of the problem in a video-clip

5.) interactive play

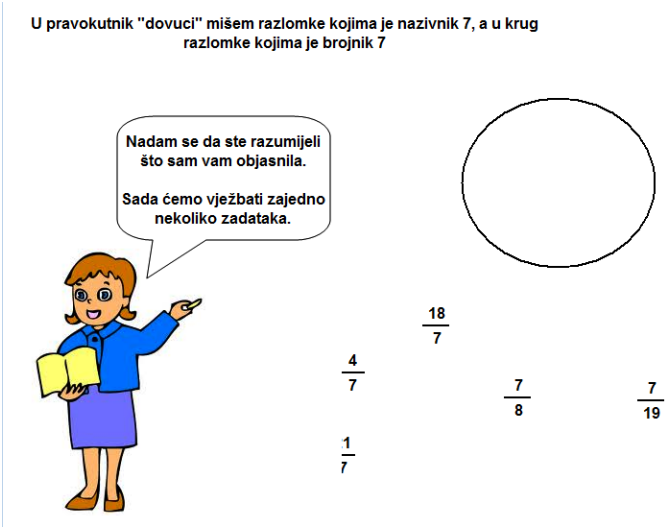
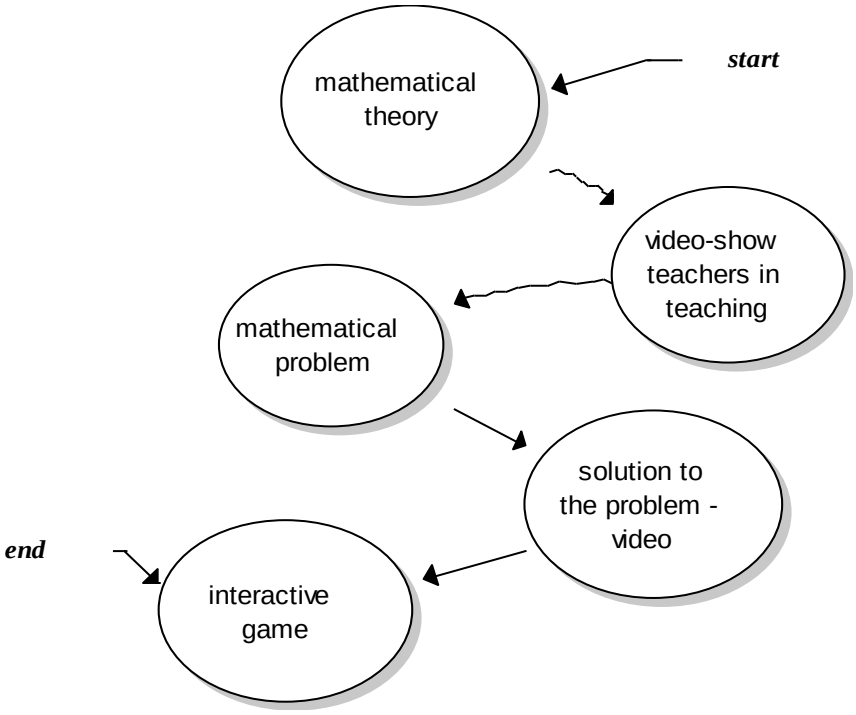


Diagram of the suggestion of the methodic model of personalized m-learning mathematic class:



Personalized approach to each student who would study the suggested mathematic content through m-learning is a specific way in which the lessons were designed. With regards to age, year, background knowledge and current interests for math, the

student will use the part of the methodic model which is suitable for him, regardless of the repetition, recall, fixing or systematization of learning content. M-learning provides the student with the possibility of choices and different combinations of learning styles through this methodic model: to study and learn the suggested learning unit completely or to choose the methodic parts which are best suited for that individual student.

Conclusion

When thinking of modern generations of children, it is important to adjust the learning and teaching ways to the everyday life style of today's students. Today's students are mobile and engaged in different aspects of their interests. Having that in mind, the traditional classroom becomes only a part of the learning process which should be upgraded by new approaches, ways and methods of learning content presentation. Thanks to m-learning, it is possible to offer the mobile learning content which will be in motion in the same way the students are, adjusting to the student in such a way that the student can learn at the time and in the place he chooses, choosing the approach to the content which he considers optimal. Suggested methodic approach to the mathematic learning content dealt with such issues, having in mind the individual differences between the students, differences that are mostly related to the differences in age and knowledge, but also interests for mathematics and ways of learning. M-learning, the student's choice of learning content and the way the content was presented provide individually adjusted methodic model for each individual student. In such way, suggested learning content becomes a part of personalized mathematic class.

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