Build and evaluate - cycle 6

MLE-Moodle

MLE-Moodle is an open-source GPL-licensed ready to use mobile Learning system designed for mobile phones. It is a plug-in for the open-source learning management system Moodle (Modular Object-Oriented Dynamic Learning Environment), which is based on the social constructionist framework of learning.

With MLE-Moodle it is possible to enhance eLearning system to mobile Learning. Students can learn either with mobile phone (mLearning) or with PC /Notebook (eLearning). On the mobile phone student can either use phones own mobile browser to access MLE-Moodle or she/he can use a special **mobile phone application** which was designed for learning on mobile phones (called MLE phone client).(MLE-Moodle 2011)

Moodle can easily be taken to use with Apache, MySQL and PHP technologies. Moodle has lots of features like lessons, assignments, forums, quizzes, resources, Blog and Wiki. Now March 2011 there are more than 54000 Moodle sites in the World. It is very popular also in Finnish senior secondary school. In Lempäälä Senior Secondary School Moodle was taken to use 2004 and many teachers are using it now.

Philosophy of MLE-Moodle is described as follows:

"mLearning uses mobile phones as a medium for learning. With mLearning it is possible to use every kind of waiting-time for learning, no matter where you are. Examples would be:

Learning while you are waiting for the bus or the train.
Learning while you are travelling.
Learning while you are waiting at the dentist.
Learning, wherever you might want to learn.

The Mobile Learning Engine (MLE) enables you to learn **wherever** you want to learn, **whenever** you want to learn and **whatever** you want to learn. But if you are **at home or at school** in front of your PC / Notebook it would make no sense to use a mobile phone for learning. That's why the MLE is intregated with an **eLearning** system (in this case this eLearning system is Moodle). With your PC / Notebook you use the standard eLearning system, if you are away from your computer you can continue learning with your mobile phone.").(MLE-Moodle 2011)

This means much deeper integration between mobile learning environment and traditional web learning environment than in case Binder Opit. MLE-Moodle is not only channel for collecting data to Moodle, but a way to use some of the Moodles core activities with mobile client.

MLE-Moodle supports these Moodle resources:

Quizzes:
A quiz tests, consists out of multiple choice, true-false, and short answer questions etc. Each attempt is automatically marked, and the teacher can choose whether to give feedback or to show correct answers.

Lessons:
A lesson consists out of multiple choices and each page ends with a question. The navigation through the

lesson can be simple or complex and the Moodle Lessons work fully on the MLE. Same learning content can be used for eLearning and mLearning .

Assignments:
You can submit an assignment or view the correction via the mobile phone. The assignments can be uploaded files (audio/video/images) or plain text.

Surveys and Choices:
The Survey module provides a number of survey instruments.

Forums:
The Moodle forums are accessible through the mobile client. You can read and create / edit discussions and replies. You are able to attach self made pictures, videos or audio recordings to your discussions and forum posts which you can instantly record with your phone or you can choose from the file system.

Moodle Ressources:
You can access a variety of Moodle ressources on the mobile phone too, for exampel text, HTML Text, image, video, audio, links and directories.

A Mobile Learning Object:

A Mobile Learning Object is a learning object especially for the MLE. It can be stored on the mobile phone and afterwards used without any internet connection (offline learning). MLOs can be created with a built-in graphical editor.

Messaging:

MLE Moodle fully integrates into the Moodle messaging system. You are notified on the mobile phone, if a new message has been sent to you, no matter if the message has been created via a mobile phone or via the Web-Browser. That is why there is no need for SMS notifications. The Moodle block "Online Users (mobile)" shows the Web users, who is online and who is currently online with a mobile phone.

Mobile Tag:

With mobile tagging you can implement context based or location based learning scenarios.
You can create tags which can be interpreted by the MLE (if your phone meets the requirements) or by any QR-Barcode Reader. Decoding a tag is as simple as taking a picture with your mobile phone.
The Mobile Tagging module allows different types of tags to be created. You can either create a tag linking to an URL, or Moodle specific tags directly forwarding the mobile user to a given course or activity. It is even possible to assign geo-information (coordinates) to a tag. This can be used to emulate GPS capabilities when real positioning is not available.).(MLE-Moodle 2011)

The two ways of using MLE-Moodle are mobile phone client and mobile phone browser.

 Mobile phone client is the special designed program for mobile phones to use such small devices for learning. It is offers some advantages:

> - Offline learning: download the learning content once and then learn without any network connection

- Easy to use: just click on a symbol in the menu of your phone and the learning application starts

- Better usability: the whole content and navigation is optimized for small devices

- All in one: with most modern phones you don't need any other third-party-application anymore.

- Compressed data-transmission through the use of a special gateway-server.

The download and installation of the mobile phone application for specific Moodle-server is integrated in MLE-Moodle.).(MLE-Moodle 2011)

Instead of an application that needs to be installed on the mobile phone, you can use the mobile phone browser which is already on your phone to access MLE-Moodle. This solution has its advantages too:

- No need to install an application on the phone - if you just want to go through a single quiz or a survey it is not necessary to install a full application.
- Because everything is online, there is no need to synchronize or update your learning content, because nothing is stored on the mobile phone.
- You can customize the look-and-feel, add your logo and slogan to the start-page.
  (MLE-Moodle 2011)

Origins of the MLE-Moodle are in the MOMO project, which stopped their development. MLE-Moodle took over their PHP code and fixed every bug found, enhanced the usability (especially the installation) and optimized the mobile client more. (MOMO 2011, MLE 2011)

MLE-Moodle is important step towards wide use of mobile learning. If a teacher is familiar with Moodle, it is not a huge leap to take MLE-Moodle to use. Installing MLE-Moodle to Moodle site is quite straightforward to Moodle administrator and for students familiar with Moodle MLE-Moodle is a natural way to use Moodle mobile way.

However, the future of MLE-Moodle is not clear. The newest version of Moodle 2.0 contains a huge number of core changes to the platform. The latest version of MLE-Moodle is from 13.5.2010. In the home page of MLE-Moodle there is text: "**Attention:** Do NOT use MLE-Moodle with Moodle 2.0!!!" We can only hope, that a new community of developers ports MLE-Moodle to Moodle 2.0.

Past projects with MLE-Moodle

In University of Rousse in Bulgaria it has been used MLE-Moodle in Physics education. They produced the lecture "**Superconductivity**" in Moodle and it can be used by means of MLE-Moodle. The text for lecture has been prepared in form as 58 Power Point slides. It presents one slide after another: what is superconductivity; discovery of the superconductivity; superconducting state; what causes superconductivity; history of superconductivity etc. A few video clips were added for visualization of the phenomenon. (Nancheva 2009)

In Indian Institute of Technology Bombay has been tested MLE-Moodle and they present a modification to its architecture for resource and network constrained environments. They installed and tested the MLE Moodle on some smart phones like N95, E60 and found it to be working satisfactorily. Also the J2ME client works on almost all Java enabled phones. (Sakharkar 2009)

There is not exactly reported experiments about MLE-Moodle available, so our reports are first ones.

Our Moodle server with MLE-support

Moodle server version used was 1.99 and MLE-Moodle was version 0.8.8.3.

Without the Gateway Server the mobile Client makes a direct HTTP-access to Moodle. The eBook-Mode with MLOs only works with the gateway-server and some older phones may have problems with large form-uploads without the use of the gateway-server. I installed own Gateway Server to same server where our Moodle is and it worked well.

A Message Server informs the user about new messages. The advantage of the Messaging-Server is that you are informed about new messages even if you do not make a request to Moodle. Otherwise the users are informed about new messages only if they access the Moodle server. To use a Message-Server is not necessary, but we used public server msm.mo2i.com.

MLE-Moodle link comes to Moodle's front page and also a link where MLE-Moodle Java-application can be loaded to the phone. When this software is loaded from that link, then automatically our Moodle-server's web address, Gateway Server's address and other settings are coming to Java-application's settings. So students can start use of MLE-Moodle by only writing their username and password.

Start | Login

MLE-Moodle

Please log-in!
Login

MLE install (phone software)

Powered by **MLE-Moodle**

Case 1 - museum education

First test of MLE-Moodle was at Kuokkala museum road with same tasks than with Binder Opit. The pupils were from 2th - 5th grade from Nurmi village school.
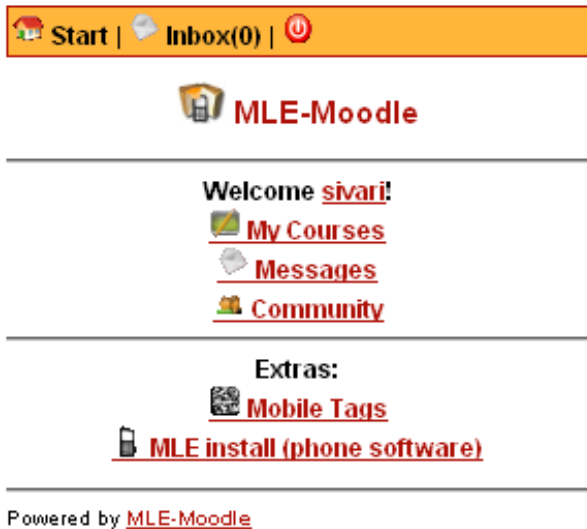
We used phones own mobile browser to access MLE-Moodle (figure 1). This was first test of MLE-Moodle in Finland. The phone model used was Nokia 6220 Classics.

We used Moodles discussion forum to implement museum education course (figure 2). Every question was one forum and every team posts there one post with photo and text. We added also to questions some intro text that tells about generic information of museum targets and was a like virtual museum guide (figure 3).

We doesn't used tags, because we doesn't get it to work even that MLE-Moodle community friendly fixed some bugs we found inside tag-system. We simply numbered the tasks and give same numbers to the discussion forums. Tags added value is not significant for mobile learning; it is more like technological toy.

Figure 1

Phone camera pictures can be sent to Moodle discussion forum with MLE-Moodle. Image must first, however, temporarily to save to camera's memory card, from which it transferred with the phones operating system and browser to Moodle discussion forum with "add attachment " - function. Our young pupils survived this well, although the feature is not particularly convenient because many clicks needed.
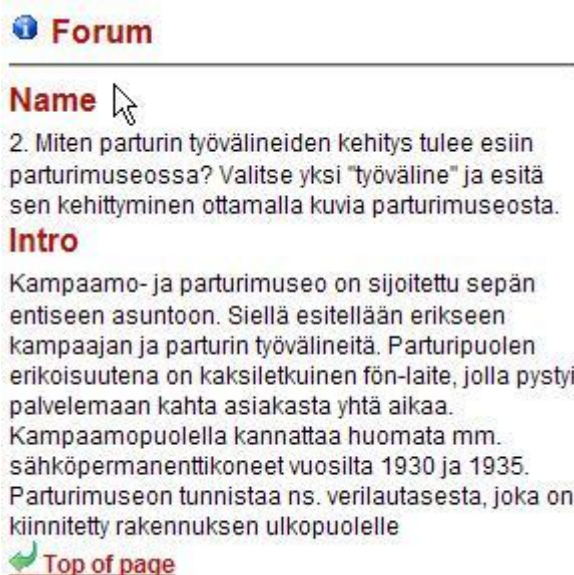
Figure 2

Figure 3

"Shoot one strange object, and invented a name for it and tell what the purpose of the object is." Team Hippos answer is this photo (Figure 4) and text "machine to make grated cheese, from top put the cheese inside and then turn the lever, and grated cheese comes out"

"Smithy of K. A. Koskinen was completed in this place in 1910. What may have been manufactured in this smithy?" In figure 5 is answer of the team soft ice cream.

All five teams get MLE-Moodle to working. So as you can see, quality of photos was good.

Case 2 – biology exam in the woods

In this second experiment we want to use MLE-Moodle Java-application.

The tasks

Pupils in the experiment were 8th grade biology class group, which had about 18 students. In the design of teaching experiment was special attention paid to the fact that the activity is closely tied to the curriculum. This was achieved clearly, because these tasks were part of the student evaluation.

Tasks were

1. Tree height: Measure the height of the tree, identify it and take a photo about it.
2. Tree species: Identify from the close range 6 different species of trees, photo them and send pictures and types to Moodle. You can found help in your phone's browser bookmarks with name tree species or directly at **http://www.puuproffa.fi/arkisto/puulajit.php**
3. Mosses: Identify at least three different moss species and photo them. Take a small wad moss in your hand and photo it in hand. Send your images and the names of species to Moodle.
4. Forest Type: Identify the forest type and send the answer to Moodle. Justify your answer.
5. Mushroom species: Locate and photo at least 6 different mushrooms. Remember all the mushrooms groups. The identification gives additional points. Send pictures to Moodle. How polypores gain their energy from? Post a reply to Moodle.
6. Pioneer species: What pioneer species can be found in this open area. Send species names and images to Moodle.
7. Field layer plants: Photo and identify six field layer plants. Send your images and type the names to Moodle. You can continue your journey back to class. If you get lost call your friends / school to get help.

Technology

Deployment of the MLE-Moodle Java application was not a straightforward process.

1. We had trouble to finding a phone where a Java application can be installed and where the application would support a camera phone and the GPS system.
2. Problems at installing at least partly due to the security certificate. When the date of the phone calendar changed the year before the date today, the application can be successfully installed.
3. Once the appropriate phone was found and the application was installed, there was an embarrassing problem. When the camera view of the application was used to taking photo, the picture came from a different point where you have targeted! When to the phone installed the latest version of its operating system, the error is resolved.

Time needed to this technical problem solving was an estimated two men working week. It is clear, that ordinary teacher is not ready to do this kind of beta- testing when a lot of trial and error work is needed.

In this experiment we used Nokia 6700 slide phones. Nokia describes phones this way:

"Pictures get us talking

The colourful and compact Nokia 6700 slide is designed for you to capture and share life's special moments, and to enjoy your choice of messaging and social networking services.

Photos and video

Take great pictures with the high quality 5 megapixel camera with Carl Zeiss lens.

You are always ready for those special moments with the dedicated capture key, autofocus and dual LED flash.

View your photos on the bright 2.2" screen, edit on your phone, and instantly share your pictures to Share on Ovi, Flickr, Picasa or other sharing sites.

Shoot video, stream video from the mobile web, and make video calls by taking advantage of the secondary camera on the front of the phone."

The resolution is 320 x 240 pixels and the software platform is S60 3rd Edition.

The phone has the characteristics (inside price range), suitable for use with mobile learning. The phone is small in size, so it is easy to take with. The screen size is sufficient to searching for information online from Internet and looking preview of images. Phone price is about 170 Euros and they were purchased 6 pieces. Students were divided into groups of three and the group gained access to one phone.

When the phones were distributed for students to try, the first question raised by them was how much the phone costs. In the woods, a student wondering of poor image quality said that his own phone has the 8-megapixel camera.

We used Elisa's 3G access with unlimited data transfer (384 kbit / s). Phones were installed to blocking calls and text messages to prevent abuse.

We organized for students a chance to try the application on the phone before the forest track. While the students are "digital age natives", there was a clear need for separate user training. When doing the assignments, there were many steps and it requires many keystrokes. Camera phone use, such as a picture taken with the preview, was also important to practice. The transition from MLE-phone application to the web browser and back again trained also, because in the one task there was a hint for pupils to use public web page.

Some students were worried and unsure when they tried for the first time application. Some pupils grieve if they will remember in the woods in a real situation, what all the buttons to press. In the test day pupils coped well, especially when in the first tasks we give if necessary support to use of the

phone. One group of the six groups has serious problems with technology. Their findings in three first tasks did not make their way to Moodle. Fourth task forward they also knew how to act correctly.

Uploading pictures from phone to the server went mainly fast. Although, at times the students asked why the download bar does not move. Students are accustomed to fixed high
speed computer network connections and they expected that the phone's data transfer is at the same level.

Only one cell phone once demanded a restart. Application functionality is in beta testing before task course found certain. The need for restart is very rare, and pictures are transferred to the server 100% certainty.

Figure 6

Figure 7

The weather was rainy and gray, so the lighting for taking pictures was poor. Some of the
images became blurred and stripey (figure 6), but there were several successful pictures (figure 7). Within the application using the camera flash and camera focus feature was not available. If you need to take accurate and high-quality images, especially if the lighting conditions are poor, it is therefore appropriate to use MLE-Moodle with phone browser. In this case, you have all the features of the camera.
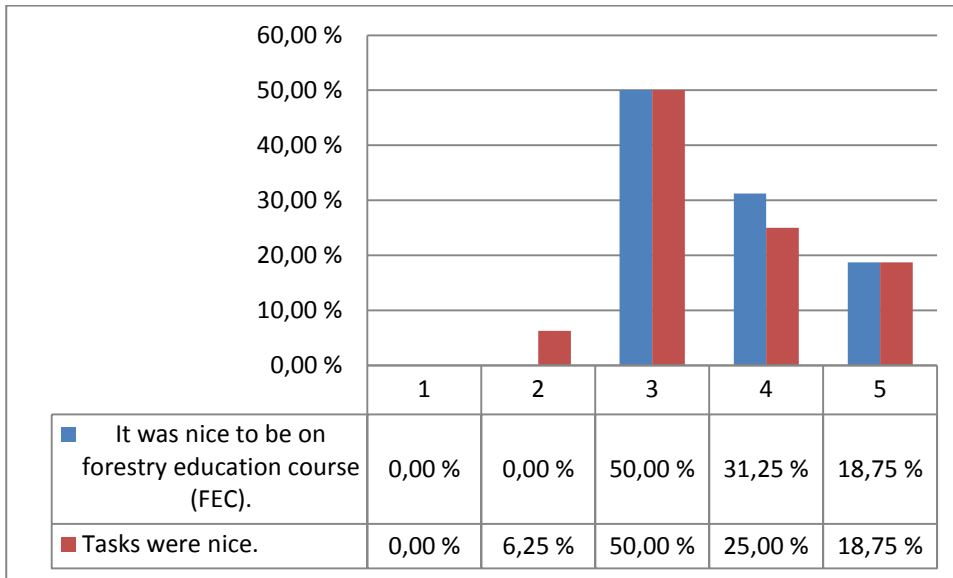
We made a number of assurances
- we tested the application in all the phones in the previous week
- batteries were loaded over the weekend (this is not obvious that batteries are loaded when starting mobile learning experiment)
- in the morning before going to the track we ensured with one phone that the system works
- the technical assistant was on the track with a mini laptop and he examined if students' answers arrive to Moodle and the students were asking whether their responses came in to Moodle and that the quality of the images was sufficient
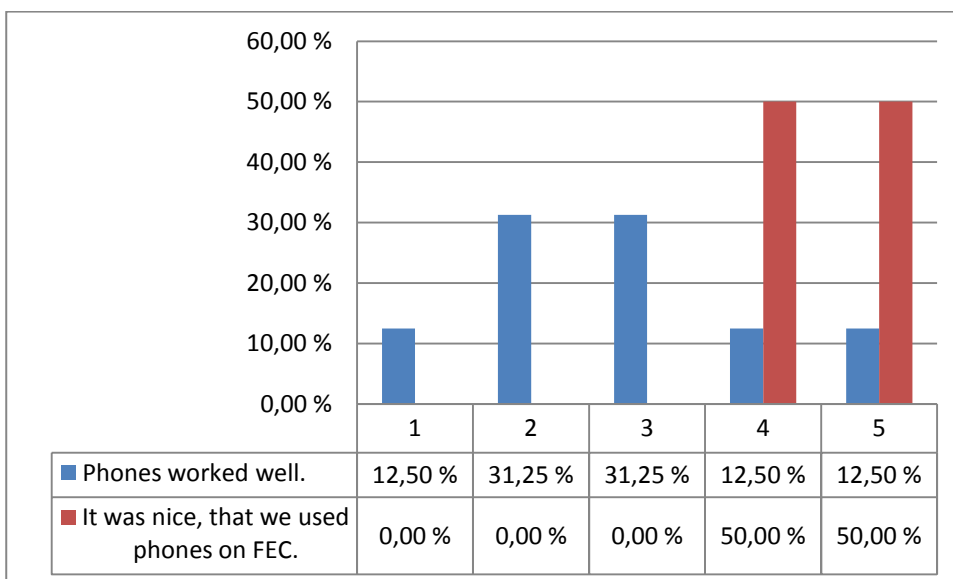
Survey for pupils

On the class there were 6 girls and 10 boys. They have all own mobile phone and all can use computer at home. They have all own Facebook or IRCGallery profile and 11 of them has updated it with mobile phone. Seven of them take photos with mobile phone weekly. Only two of them use mobile Internet weekly.
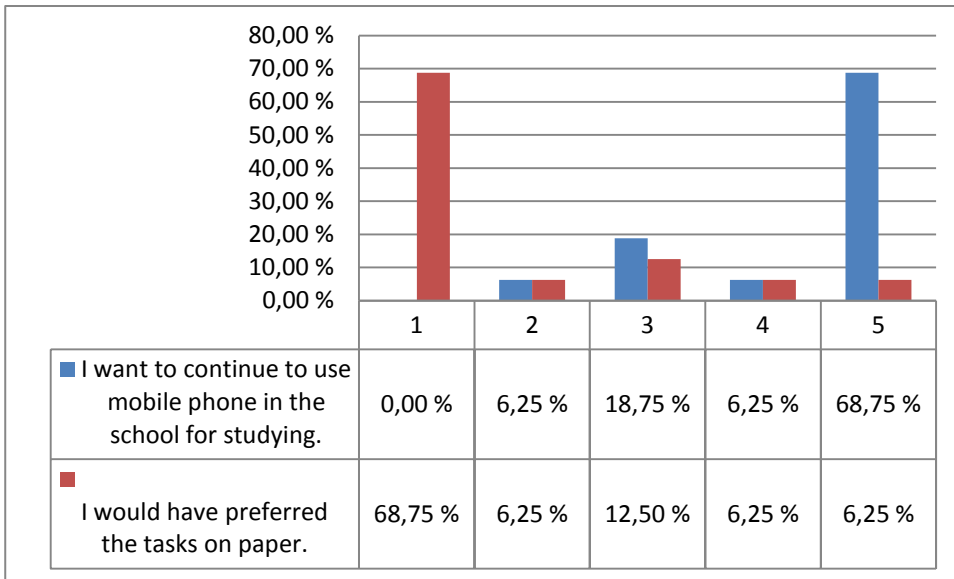
We have only six mobile phones with application on the task course, so pupils made tasks in the groups. Eleven of 16 pupils used MLE-Moodle on the pathway.

	1	2	3	4	5
■ It was nice to be on forestry education course (FEC).	0,00 %	0,00 %	50,00 %	31,25 %	18,75 %
■ Tasks were nice.	0,00 %	6,25 %	50,00 %	25,00 %	18,75 %

There was not pupils that doesn't like to be on the forest.

	1	2	3	4	5
■ Phones worked well.	12,50 %	31,25 %	31,25 %	12,50 %	12,50 %
■ It was nice, that we used phones on FEC.	0,00 %	0,00 %	0,00 %	50,00 %	50,00 %

Only 25 % of pupils was satisfied to how phones were working, but all felt it nice to use them.

	1	2	3	4	5
■ I want to continue to use mobile phone in the school for studying.	0,00 %	6,25 %	18,75 %	6,25 %	68,75 %
■ I would have preferred the tasks on paper.	68,75 %	6,25 %	12,50 %	6,25 %	6,25 %

Pupils want to use mobile technology to studying also in the future. Only few pupils wanted to have tasks on paper.

	1	2	3	4	5
■ I would like to continue to participate in this type of experiments.	0,00 %	0,00 %	25,00 %	25,00 %	50,00 %
■ Mobiles was easy to use when doing tasks, when it worked properly.	0,00 %	6,25 %	6,25 %	43,75 %	43,75 %
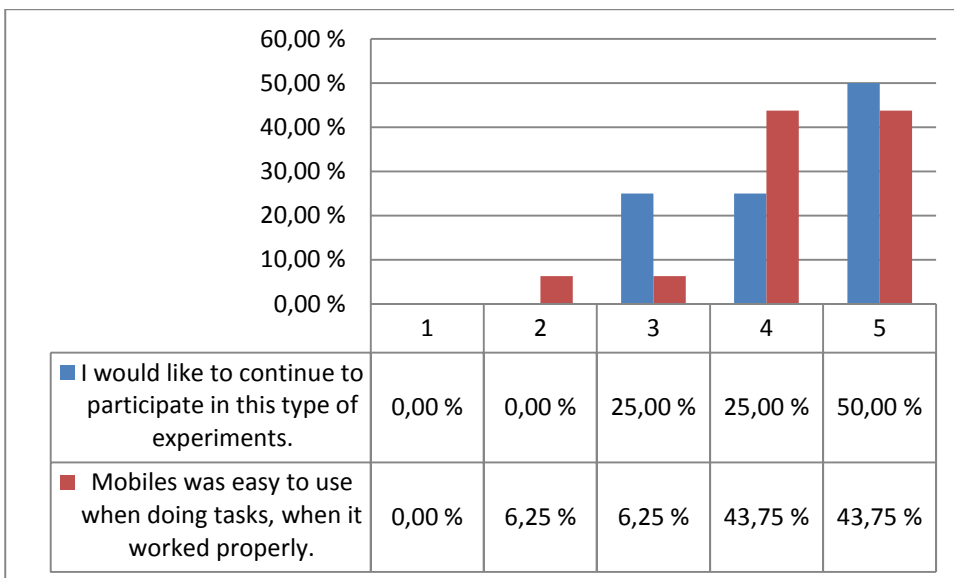
There were not pupils that don't want to take part this kind of experiments any more. Pupils found mobiles easy to use.

	1	2	3	4	5
■ Biology is at school nice.	6,25 %	12,50 %	37,50 %	31,25 %	12,50 %
■ I like to play computer games.	0,00 %	6,25 %	6,25 %	18,75 %	68,75 %
■ I like working on the computer at school.	0,00 %	0,00 %	0,00 %	25,00 %	75,00 %
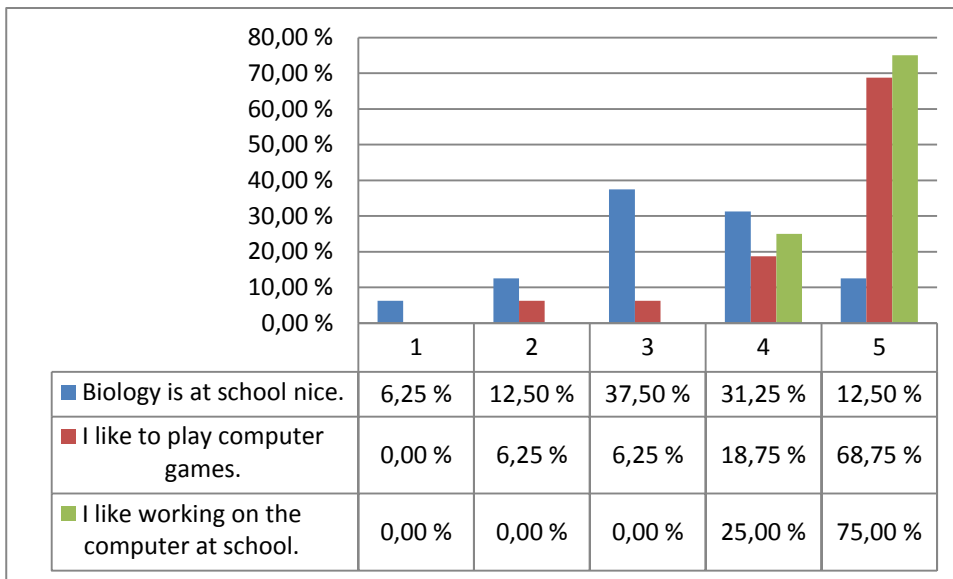
Some open questions were put to pupils:

What on museum education course was the nicest?

"To get out from classroom."

"Walking in the forest."

"Groupwork"

What was the most boring?

"Rain"

"Internet was not working one time."

"Waiting when phone was loading pages"

"Mushrooms"

What was the hardest with cell phone?

"Get a good photo"

"Photographing"

"using Moodle"

How you would do the system better?

"Better Internet connection"

So pupils welcome mobile learning in the forest and MLE-Moodle quite well.

Lessons learned

1. MLE-Moodle is a new approach to mobile learning. It connects mobile learning environment directly and bidirectionally to traditional web based learning environment. Like Moodle it is free to use, so there is a lot of potentiality within it. Why it is not widely speared?
   - Peoples involved in mobile learning projects want to use MLE-Moodle Java-application (merely than MLE-Moodle with phones own browser) and it is not always easy to take use as in our case can be seen
   - MLE-Moodle is a quite new product.
   - If Moodle environment is from external service provider, they are not always ready to install Moodle extensions like MLE-Moodle; there can be some risks (security, database integrity) with them.
2. In open source products there are also bugs of course. MLE-Moodle community fixed found mobile tag decoding bug for us rapidly. But if community of open source product is not very active, you are in our own. With commercial products you can always complain to sellers.
3. We used brand new phones and there were not a lot of hiccups. Biggest problem was quality of photos when MLE-Moodle Java-application was used. There was not possibility to use zoom or flash inside it. But if you use MLE-Moodle with phones own browser you can use directly phones camera with all features.
4. With MLE-Moodle many features of Moodle comes available with ordinary mobile phone. An interesting scenario would be mobile learning inside class room in ordinary lesson. Every pupil would have access to Moodle with her or his own phone (one device – one pupil). This is the place for further research. Scenario is realistic only if fixed price mobile data connections come popular or phones with WLAN support come more frequent.
5. Android Tablet-PC:s are now making breakthrough. With 7 or 10 inch screen and WLAN/3G it is possible to use Moodle directly without MLE-Moodle. Price of cheap WLAN-models without 3G is 100 Euros so it is possible to equip with 2000-3000 (+ price of WLAN access point) Euros a movable mobile learning classroom. Even poorest Finnish municipals have able to afford this.
6. The future of MLE-Moodle is unclear. Would there never been support for Moodle 2.0? Hopefully some new community of developers takes source code and starts to develop it, like in case of MOMO. Another "threat": Is it any more need for light user interfaces or is power and screen size of new mobile devices making them useless. In developing countries need of light user interface is clear also in the future and also in Finland if we use pupils own mobile devices.

Sources

MLE-Moodle 2011

http://mle.sourceforge.net/mlemoodle/index.php?lang=en

MOMO 2011

http://www.mobileclassroom.at/momo18/

Nancheva 2009

M-learning of the superconductivity; Multimedia in Physics Teaching and Learning MPTL 14
http://www.fisica.uniud.it/URDF/mptl14/ftp/full_text/T1_14%20Full%20Paper.pdf

Sakharkar 2009

MOLE: An Extension to MLE Moodle, Hemant Sakharkar, Sridhar Iyer and Malathy Baru *Department of Computer Science and Engineering Indian Institute of Technology Bombay* National Conference on Open Source Software, Mumbai, India, May 2009.

http://www.it.iitb.ac.in/~sri/papers/mle-ncoss09.pdf