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‘Open source information society from beginners to advanced’ in the Hungarian education

The possible roles of Moodle in the Hungarian teacher training

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Key words: *digital literacy, Moodle, teacher training*

Abstract:

These days, special emphasis has been put on the importance of the ICT competencies in the teacher training. The most effective way of developing these competences is to integrate well the proper technologies into education. In our Institutions we have used the Moodle Learning Management System for years. This presentation points out the potentialities of Moodle including other open source and web based learning applications.

1 Introduction

It is a well-known cliché, that we are living in an information society, even if its beneficial effects cannot always be realized. In Hungary, the documents about the importance of the formation of a knowledge-based society [1] were accepted in 2003. Unfortunately this view lasted only for four years. Today, the political focus has already changed. These days, special emphasis has been put on the communication and activity within virtual spaces (e.g. e-learning, e-government).

The first part of the paper deals with a general problematic issue: the digital literacy of the human resources.¹ This paper represents a survey approach in order to analyse the importance of an open source software in the forming of digital literacy. I will summarize some of the results from the student segmentation survey carried out by the NET-IS network between January and March 2007 in Estonia, Greece, Hungary, Slovakia and United Kingdom. (*NET-IS – Network for Teaching Information Society*). In this presentation I'm going to focus on the results of the Hungarian researches including the research conducted by myself. It was carried out through the SZIU FAPA's Moodle system.

The present paper starts with a general problematic issue: the digital literacy of the human resources. The use of Moodle not only can help to create effective online learning communities but also influences the students' learning habits and mobility. In order to show the importance of an open source software in the forming of digital literacy the most frequent results of NETIS (Network for Teaching Information Society) questionnaire 2005, 2007 will be presented in the first part. [2, 3, 4]

¹ In this paper HR means NOT a concrete employee, but a potential employee. That is, it refers to the people or students who are doing their studies in the educational system at the moment. Learning, however, for these people, doesn't only mean to get an academic degree finally, but to have the opportunity to get a competitive knowledge, too.

The facilities of learning and the methods associated with them have been changed radically; it seems to be crucial to widen our student teachers fundamental competence with ICT use in practice. The second part of the paper will present how the student teachers can apply strategies for solving problems and use appropriate tools for learning, collaborating, and communicating in our competencies based Moodle training programme.

The third part of the paper will show the technical side of the project. We applied various devices, for example WIKI, glossary, workshop, social places, forums, chat and instant messaging and more Web 2.0 applications.

1.1 What does the title mean?

Open source information society in the Hungarian higher education: agreeing with others I think that the success of a country is based on the education. A teacher must do everything to provide a competitive knowledge for their students. One of the effects of the budgetary restrictions is that the educational institutions are seeking for cost-effective solutions. There is a strong need for efficiency and innovation at the same time. To achieve this, there are more and more educational institutions in Hungary that use open-source softwares in the education. One of the most widely used and the most successful application on the basis of researches and experience is (called) Moodle (Modular Object-Oriented Dynamic Learning Environment). We experienced that the use of Moodle not only can help to create effective online learning communities but also influences the students' learning habits and mobility.

1.2 General problematic issue: the digital literacy of the human resources



(Picture 1: Less motivated student (source: internet, only illustration))

The upper picture illustrates the situation of teacher training very well (Picture 1.). On one side there is the modern and accessible ICT, but on the other side there is a less motivated and interested student. [5] Through the changes of the higher education system (Bologna process), which is in progress at the moment, the old questions regarding education have been brought up again with being placed even more emphasis on them and giving them a wider publicity. These are, among others:

- Is the current 'traditional' structure of the teachers' training the most appropriate?
- Will the teachers have the fundamental competence with which they will be able to teach the next generation?
- What sort of knowledge, skill is needed for the development of the ability necessary for life-long learning?

If you take a look at the picture bellow, then you can see a good example of the young generation's aptitude and interest in ICT (Picture 2). This is a Hungarian example, a Multi Center, where children learn and use programs designed especially for them. Though the

computer programs are not related closely to the school subjects, they are very good for developing digital literacy at that age.

What do I mean by informational literacy? In short, informational literacy is practically, the capacity for the effective use of the information in order to solve a problem with ICT devices. As a result of this, there is a wide gap taking shape between the teacher and the student in terms of ICT usage. Maybe, we have to wait 15-20 years to bridge this gap.

The acquisition and transmission of the knowledge need new, special teaching-learning methods, and these new methods are precisely associated with the information technologies (ICT). That's why we use, for example, the potentialities provided by MultiCenters or Moodle to develop digital literacy competence.



(Picture 2: (source: <http://www.deryne.hu/modules.php?name=multic>))

Developing digital literacy is the function that the Moodle's infrastructure serves (activity and communication) and the courses running there. We are going to highlight/introduce/select one of these courses a bit later (see also chapter 2), which concentrates resolutely on the problems mentioned above with a strong intention to solve them.

1.3 What is the Moodle?

Moodle (Modular Object-Oriented Dynamic Learning Environment) is a free software e-learning platform (*also known as a Course Management System (CMS), or Learning Management Systems (LMS), or Virtual Learning Environment (VLE)*). Moodle is designed to help educators create online courses with opportunities for rich interaction. Its open source license and modular design means that many people can develop additional functionality, and development is undertaken by a globally diffuse network of commercial and non-commercial users, spearheaded by the Moodle Company based in Perth, Western Australia.

1.4 NET-IS – Network for Teaching Information Society

The local ISERC² in Jászberény, also took part in the NETIS project. The NETIS online survey was available between January and March 2007 and it was carried out in *Estonia, Greece, Hungary, Slovakia and United Kingdom*. In this paper we will concentrate mainly on the Hungarian results. The target group was the student population of the countries

² ISERC – Information Society Education and Research Centre, Jászberény – member of ISERGs' (<http://www.ittk.hu>)

participating in the project. The NETIS questionnaire was completed by the students who also use the College’s Moodle system. [2, 3, 6]

1.5 Moodle & the students’ learning habits and mobility

The questionnaire contained 50 questions including short interviews. In this paper I will focus on some issues- which are the following: Because of the limited time, I would highlight three of them.

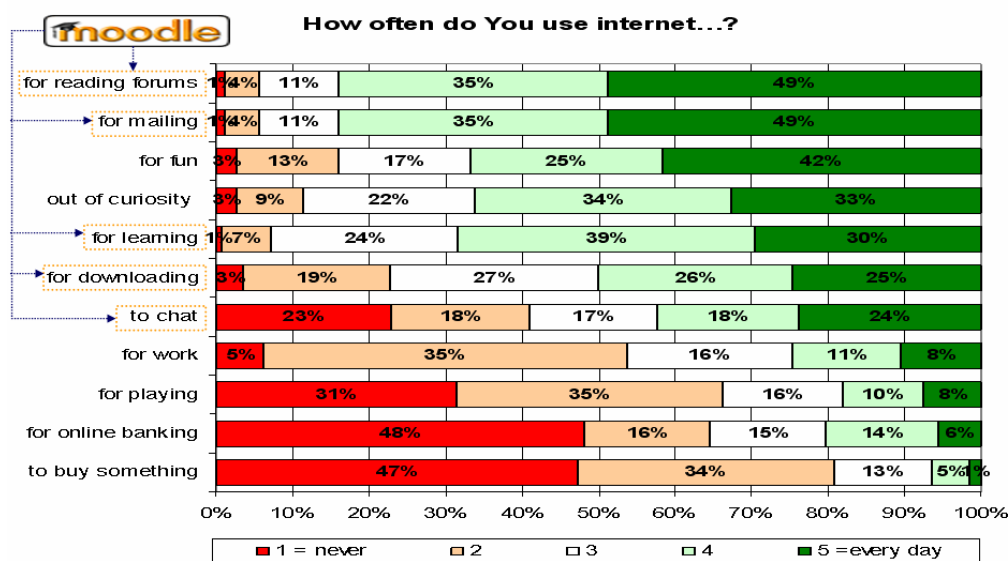
- Characteristics of internet usage
- Primary Learning Sources
- Blended learning is most popular

1.6 Characteristics of internet usage

The most frequently used service is e-mailing and the activities connected to interest, entertainment and education. Participants read forums quite often; as Figure shows, half of them visit forums every day. The most rarely used internet services, which almost half (47-48%) of the respondents never use, are the financial ones (online banking) and the online shopping. The most frequently used services are: reading forums, mailing, learning, chatting, and downloading.

They also play an important role in the use of Moodle, when we work in a virtual classroom. Because of routine or ((because of)) the deficiencies of their ITC devices students often stick to the ‘Guttenberg-Galaxy’, and a part of their work is also handed in, printed on paper (and they send them online at the same time). [7]

Currently it is also a characteristic of the students’ mobility that though they have Internet access at home, they prefer to do their work at the school/college. They don’t completely trust in the form of sending their work from home (and not in their home PCs, networks either). It occurs that besides sending their papers through the Internet, they personally hand in their work in print, at times, travelling several 10-100 km for that. [3, 4, 6]

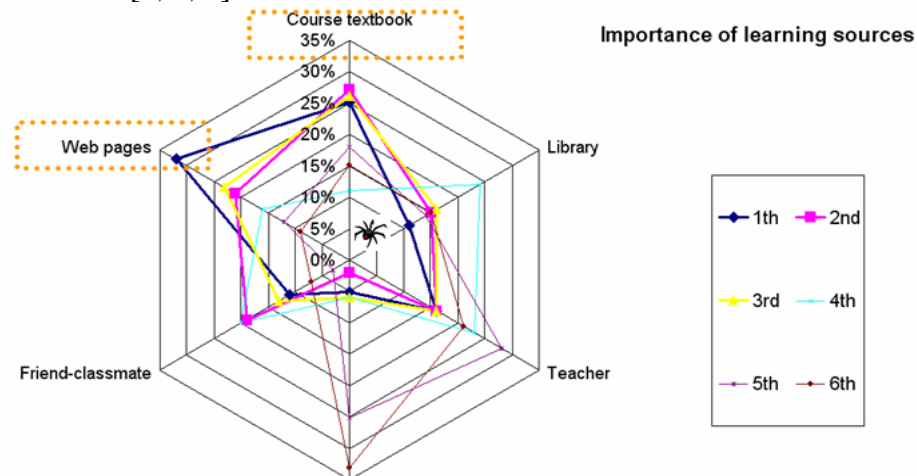


Source: NETIS, R.1.1 Student Survey Report

Figure 1: How often do you use internet? (Source: NETIS 2007, Student Survey Report)

1.7 Primary Learning Sources

What students consider as the most important source of information needed to their studies. Greatest proportion of the respondents regarded the internet and textbooks as the most important sources, while adults (parents) and teachers seemed to be less important sources. Every third respondent (33%) considered internet as the most important source of information needed to their studies. [3, 4, 6]

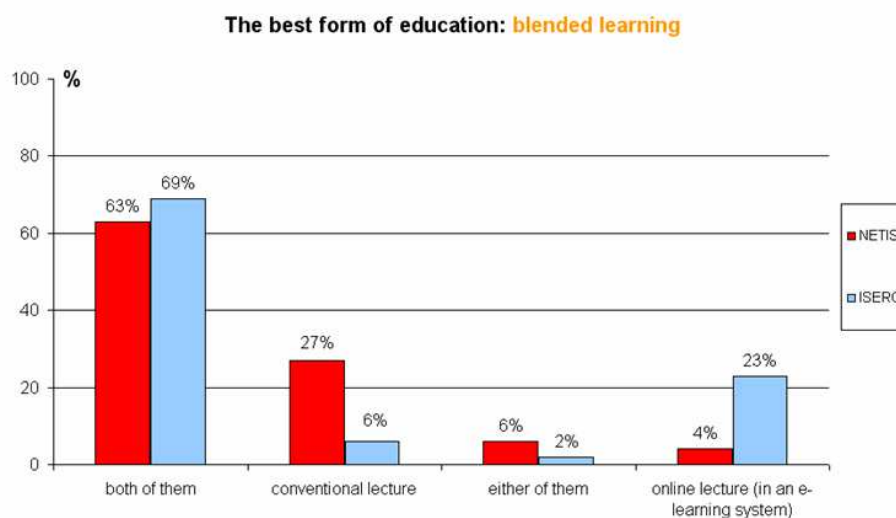


Source: NETIS, R.1.1 Student Survey Report, created by the author

Figure 2: Importance of learning sources (source: NETIS 2007, Student Survey Report)

1.8 Blended learning is most popular

For the question: What is the best form of education? The majority of participants (63 and 69%) claimed that conventional lectures rounded off with online lecture (e-learning) would be the most effective form of education. Respondents practically rejected the online lecture in itself. The number of online lectures are significantly higher in our institute, because the majority of the respondents do one (or some) of my courses. And I usually give tasks through Moodle in almost all of my courses. [3, 4, 6]



Source: NETIS, R.1.1 Student Survey Report & ISERC Survey Report 2007, Moodle feedback

Figure 3: The best form of education (source: Student Survey Report of NETIS 2007 and ISERC Survey Report 2007, Moodle feedback)

2 Moodle training programme

2.1 *Electronic curricula*

In collaboration with Debrecen University, our College developed a new group of subjects within the frame of the HEFOP 3.3.2 project entitled “The popularization of competence-based teaching and learning programs in teacher training”. The new subjects assist the acquisition of informational, educational and methodological knowledge, in relation to the in-school application of ICT devices. One of these new subjects is called “Electronic curricula”. The primary aim of the subject is to provide the students with a comprehensive view on the different forms of electronic curricula and their characteristics. But what makes the new subjects necessary?

In Hungary, teacher training only covers the forming of basic skills related to informatics within the frame of compulsory subjects. At present, the application of ICT devices as educational tools can exclusively be met during optional subjects. The choice of these subjects, however, is rather limited. This is what we intend to improve by introducing new subjects, which will be introduced in several higher educational institutions in September 2007. We consider it essentially important that future teachers should not leave the training institutions without having acquired the theoretical as well as the practical knowledge related to the application of ICT devices in education.

The teaching of such subjects is not unprecedented in our institution. Since 1998, the following subjects have been offered to students who major in teaching and study information technology in the form of optionally available subjects:

- HTML I. (developing static web sites)
- HTML II. (developing dynamic web sites)
- Web-design
- The basics of multimedia development
- Flash
- Development of educational materials
- Computerized animation
- The application of the internet in education

The development of the new subject was now made necessary by the fact that due to the speedy spread of networks and the internet the competence structure that we need today has significantly changed. New skills are needed in the world of network applications. Society has also witnessed considerable changes resulting from the appearance of the new technical devices.

The attitude of the rising generation towards knowledge has greatly altered. Possessing information, they are able to mass-produce and widely spread new content or new information. The discrepancy between the studying methods of students and the teaching methods of schools, as well as between conveyed and required content is greater and greater. The question arises how long our students will accept the education system (or learning methods) we offer them.

Students must be prepared for acquiring the new competences of digital society. Changing roles must be adapted to in a changing society. The characteristics of teaching-learning are changing, too. Hodgins summarized the differences between the old and the modern forms of learning in the table below:

Today	Tomorrow
Technology training	Performance improvement
Classes for the masses	Personalised learning
Sage on the stage	Guide on the side
Instructor centric	Learner centric
Training when scheduled	Learning on demand
Time to train	Time to perform
Teaching by telling	Learning by doing
Subject-based learning	Project-based learning
Learning to work technology	Putting technology to work
Know-what	Know-why
Basics = 3R's (reading, writing, arithmetic)	Basics = Higher order thinking
Skills & Information mastery	Inquiry, discovery & Knowledge
Re-active	Pro-active

Table 1: Emphasis change in the learning process [8]

The main mission of the subject entitled „Electronic curricula” is to improve practical skills. Our aim is to make students accomplishing the course be capable of applying the newly acquired knowledge in their own practice.

Our other important purpose is to form the methodological culture of students. Students get to know a good variety of reform pedagogical methods in theoretical classes during their studies. We provide an opportunity for them to test these principles and methods in practice. In addition to basic theoretical knowledge we wish to make students able to select the most suitable form of activity for conveying information, as well as the tool and application that suit a given activity the best.

The efficient e-Learning methods presuppose student cooperation. During the course the students are encouraged to use collaborative methods extensively. To achieve this, they have to learn new roles. This means that they should not only convey information but develop student competences that allow them to learn the new autonomy needed for discovering and acquiring knowledge. [9]

In accordance with our purpose, we improve ICT competences together with the pedagogical ones. It would be useful if students could study with the help of the methods identical with the ones they will use in teaching in the future.

The students are to prepare a masterwork during the semester. They elaborate the topic of some classes of a chosen subject. They prepare for teaching this. The preparation of the masterwork is carried out in groups with a few members. Each group selects one from among the given pedagogical methods, and plans the masterwork according to the features of the chosen method. A good number of activities performed within the frame of the subject (for instance the division of the curriculum into parts, the definition of media elements, etc.) also contributes to the preparation of the masterwork.

During the course the students can get information about more applications than they make use of while preparing the masterwork. The characteristic features, services of these applications are analysed by the students themselves. They share the acquired information and evaluation with their fellow students. The “main” course of the subject allows the students to

collect evaluations, nevertheless the students are also provided with a personal learning environment. This task is fulfilled by an ELGG server. Naturally, all the students are given the opportunity to test the applications.

The range of the applications is not limited. It is influenced by the knowledge, interest of student groups, and the chosen topic for the masterwork. The students themselves are also free to recommend or look for new applications, which they evaluate and introduce to the others. The subject comprises 30 lessons. The students acquire the information of 11 topics in the course of 15 occasions. These are the following:

- Computer in education
- Multimedia
- The construction of the electronic curriculum
- Authoring systems
- What is e-Learning?
- Standard e-Learning content packages
- IMS Learning Design curriculum
- Metadata
- Online learning systems (LMS, LCMS)
- Communicational forms
- e-Learning 2.0

The biggest number of classes (6 classes) is devoted to Online learning systems. Within the frame of this the students learn about the tools and services of Moodle, as well as the managing methods of the students. A similarly great number of classes discuss “Standard e-Learning content packages” and “e-Learning 2.0”. These two topics involve a significant part of practical knowledge. It is mainly the topic e-Learning 2.0 that has an effect on the whole course. [10]

Although the topics listed are logically connected and dependant on one another, they are not in strict chronological order. Among the selected applications there are many similarities; therefore a certain topic arises here and there in various contexts.

Most of the activities related to the subject are performed within a Moodle frame system. The students are supplied with the theoretical information within the frame of a course on Moodle. This course holds together the communication of the student group. It provides the students with a variety of compulsory and optional activities. In the Moodle system, the students get a course each to prepare their masterwork. They can get access to sample courses in the Moodle system.

During the preparation of the masterwork, for developing our own parts of the curriculum we use eXe XHTML e-Learning Editor, with the help of which they produce SCORM Content Packages. Besides this, the students can also develop Learning Design curricula in the LAMS (Learning Activity Management System) system. We contribute to the localization of these softwares, which allows the students to use them in their mother tongue. Furthermore we wish to learn about as many web 2.0-applications as possible, together with the possibilities of using them as educational tools.

3 The technical side of the project

As it was mentioned earlier, in this project we used the Moodle Learning Management System. Our aim was to use a free and open source LMS, which does not require any commercial components (e.g.: operating system, database, etc.). We have tested [11] some open source LMS (e.g. Ilias, Sakai, Atutor, Dokeos, Moodle) and Moodle had all the technical possibilities and pedagogical principles we needed. [12]

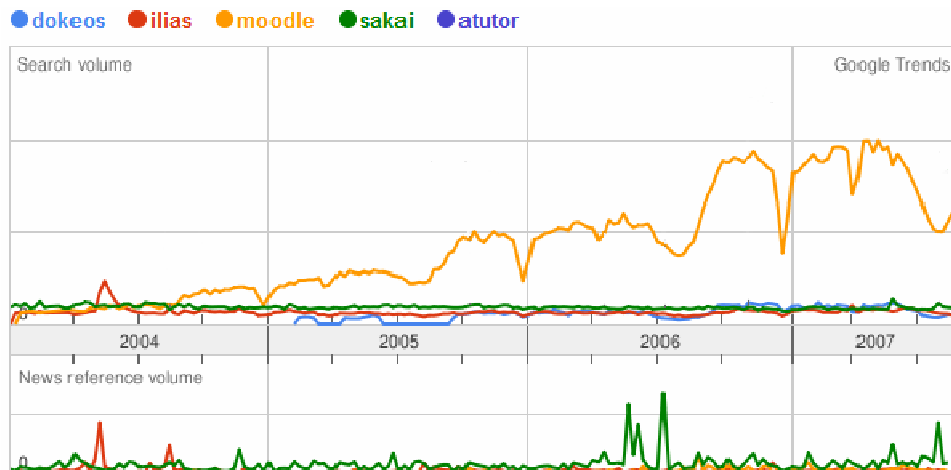


Figure 4: The popularity of some open source Learning Managements Systems

This graph (Figure 4.) was made with Google Trends (<http://www.google.com/trends>) and shows that Moodle has become the most popular LMS in the open source section. Our decision proved true. Beyond the Moodle we are using several open source software:

- We use the Linux operating system, usually Ubuntu or Debian distributions, the Apache web server, the MySQL database software, and the PHP open source programming language.
- ELGG (<http://elgg.org>) is used to build social network and ePortfolio [13]
- To develop e-Learning contents (SCORM packages) the eXe XHTML Editor (<http://exelearning.org>) and the Reload Editor (<http://www.reload.ac.uk>) were applied.
- Furthermore we use AWStats (<http://awstats.sourceforge.net>) and Google Analytics (this one is not open source, but free - <http://www.google.com/analytics>) for log analyzing.

3.1 Moodle in Hungary

In Hungary Moodle is generally used in higher education (more than 70% of the universities and colleges apply Moodle), and there are number of Moodle sites in the primary and secondary schools.

In our institutions (Szent István University Faculty of Applied and Professional Arts, Department of Science - Information Society Education and Research Centre and Kölcsey Ferenc Teacher Training College of the Reformed Church) six active Moodle sites are running:

- <http://Moodle.abk.szie.hu>

This site is used by cc. 3000 registered users. The users are students aged between 18 and 55 (full-time and part-time students) and the teachers

- <http://gyakorlo.abk.szie.hu>

This is the practical training school (primary school) of the Teacher Training College. The users are children aged between 7 and 14, and their teachers

- **<http://conference.abk.szie.hu>**

This website is the test interface of the 1.8 version. Besides, the organization of conferences and application projects are taken place here

- **<http://Moodle.kfrtkf.hu>**

This site is used by more than 2100 registered participants. They are students, teachers and administrative employees.

- **<http://homokozo.kfrtkf.hu>**

This site is a playground for new users of Moodle. There are several test courses to show the capabilities of Moodle and to get practice in using Moodle (340 registered participants).

- **<http://Moodlemoot.kfrtkf.hu>**

This is the website of the Hungarian MoodleMoot Conference and the Hungarian Moodle Community. We also use it as a community space of the e-Learning Department of John von Neumann Computer Society. This site has 319 users at this moment, and increases day by day.

As it can be seen we have more than 6000 Moodle users and 3 years experiences in managing and using Moodle courses.

3.2 Activities

In the last 3 years we analysed the logs generated by the MySQL, and the Apache web server. This diagram shows the number of page downloaded on the site <http://Moodle.kfrtkf.hu>. The increment is continuous and linear, which means that our students' activity was growing every year (Figure 5.).

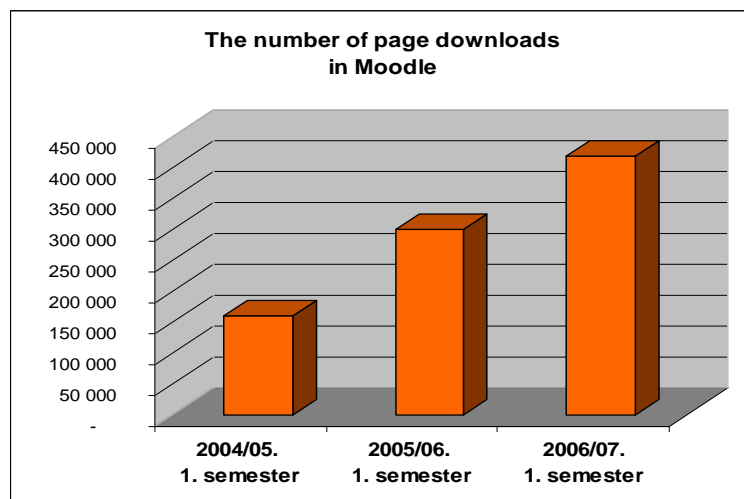


Figure 5: The number of page downloads in MOODLE

The number of external accesses during the last semester suggests clearly that students spend more time with Moodle at home. The external accesses to Moodle (not from the computer network of the college) has increased from 43000 to 246000. (Figure 6)

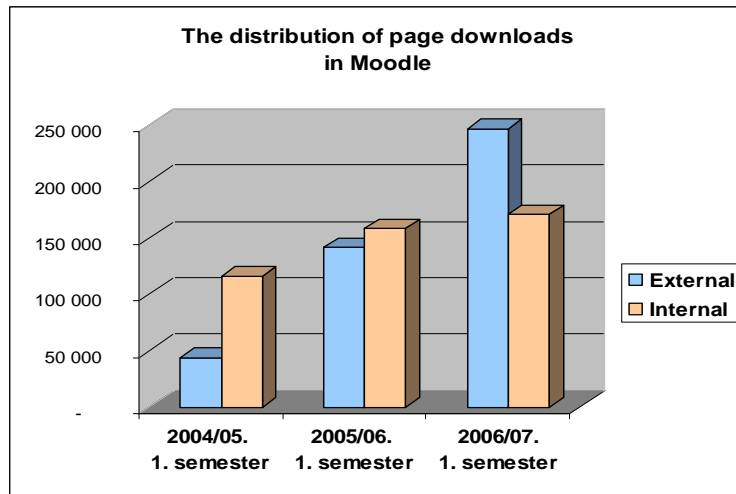


Figure 6: The distribution of page downloads in MOODLE

When we started to apply e-Learning courses our goal was not only to implement new technical based learning but also to initiate new pedagogical methods. Moodle has many type of activities, and some of them suitable for collaboration.

During the last semester we mainly used 9 activities to evaluate our students’ development. Interestingly, these activities can be divided into two groups. The Online and offline assignments, the lessons and quiz encourage the individual work, while the other five activities are mainly based on Students collaboration (Table 2.). (Figure 7, 8, 9)

Moodle	
“Classical” Activities	Activities based on collaboration
Online and offline Assignments	Forum
Lesson	Database
Quiz	Glossary
Hot Potatoes Quiz	Wiki
	Workshop

Table 2: MOODLE activities

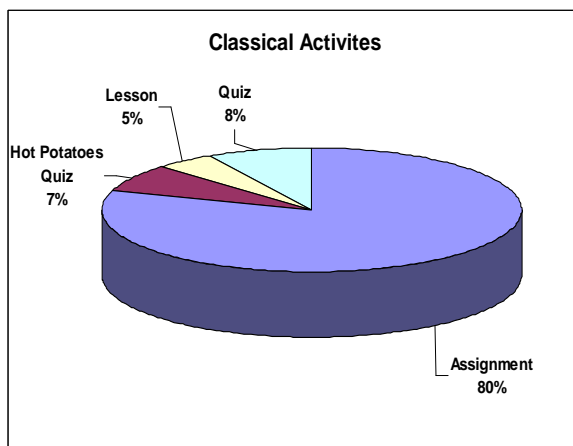


Figure 7: Classical activities

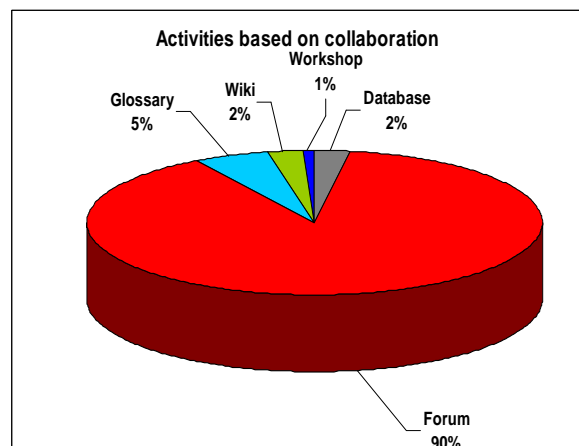


Figure 8: Activities based on collaboration

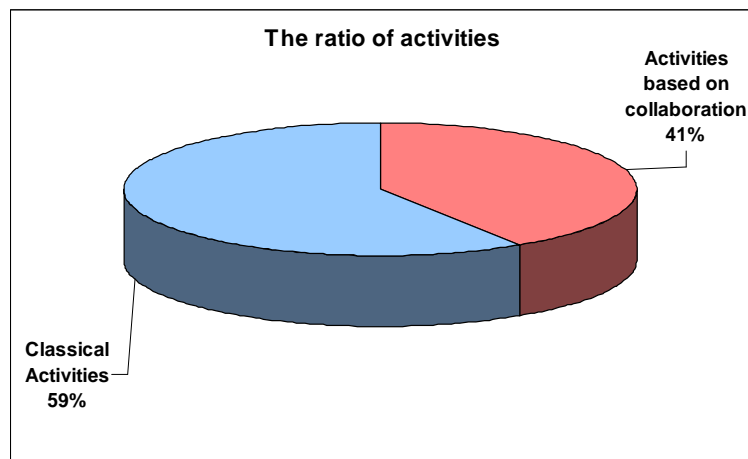


Figure 9: The ratio of activities

A significant part of our activities in the Moodle require cooperation and the knowledge of ICT. The distribution of these activities shows the predominance of the non-cooperative activities. Another experience that students absolutely do not like the Moodle's internal online communication device called chat. They used forums with pleasure, but instead of using chat they worked with external instant messaging softwares (e.g.: MSN Messenger, Skype).

In addition to the possibilities of Moodle we apply several Web 2.0 applications e.g: Wikipedia; Blogs; Google- Alert, Analytics, Documents and Spreadsheets, Mail, Maps, Reader, Trend; YouTube; Flickr; Del.icio.us; etc. and some mashups (e.g.: <http://flickr.com/map>).

This project demonstrates our capability to build an e-learning environment using open source software and free web applications only. Based on these and ICT competences new pedagogical methods can be implemented.

On the one hand, the changes of mindset in the education are not so radical. On the other hand the students and the teachers as well have to prepare for the new challenges of ICT. This project demonstrated that we were able to build an e-learning environment solely using open source software, and free web applications and based on ICT competences we could implement new pedagogical method.

4 Conclusion

4.1 The summary of basic problems of the teacher training

<i>Some fundamental problems of the Hungarian teacher training (not a complete list)</i>		<i>The possible methods/ways to solve the problem</i>		<i>Goals</i>
Lack of information about the demands of the teachers and students	➔	Researches, surveys (NETIS, ISERC, other nationwide surveys)	➔	Abundance of information, feedback through the results of the surveys
lack of devices and resources	➔	Open-source softwares and decreasing hardware prices	➔	'Broadband Internet access is a basic right!'
less motivated students, lack of competence	➔	Application of cutting-edge teaching technology (e-learning, multimedia, MOODLE courses)	➔	Up-to-date teaching materials by applying ICT (shorter cycle time/loop time)
Out-of-date education structure	➔	Bologna process	➔	Transparent and permeable higher education in the EU
Lack of market orientation (autotelic education structure)	➔	Reduction in the number of the students, more up-to-date teaching methods (e.g. the application of e-learning) MOODLE course	➔	Where possible, involvement of the participants of the regional human resources

Table 3. The summary of basic problems of the teacher training [4]

The Moodle sites run by us and by other universities and colleges are trying to find solutions to the problems summarized/outlined in the table above. We highlighted only some of the fundamental problems of the Hungarian teacher training, but the list is not complete at all.

Online surveys and the ones based on questionnaires promote building up new development strategies. Feedback from the teachers/instructors and students are vital for the short-term and long-term planning.

While the main emphasis is on the reform of education structure, on the resource gap and on the competence development³, one of the most important components for the information society's development is the human resource.

We should imagine such a cyclical process in which the cultural and educational development determines the technological development, which determines the economic development, which determines the social development, and which determines the cultural and educational development, etc. [14] The role of the prospective teachers is twofold: on the one hand as young people, on the other hand as teachers playing a prominent role in the education system, they have to prepare for the challenges of the global information society.

³ Competence development means in these terms mainly the development of digital literacy.

References:

- [1] Hungarian Information Society Strategy, Informatikai és Hírközlési Minisztérium 2003, http://www.gkm.gov.hu/feladataink/inform/strategia/mit_str.html
- [2] Network for Teaching Information Society 2005 (<http://www.ittk.hu/netis/>)
- [3] Network for Teaching Information Society 2007 NET-IS – Network for Teaching Information Society (<http://www.ittk.hu/netis/>) R.1.1 Student Survey Report (<http://www.ittk.hu/netis/>)
- [4] Robert Sinka: ‘Open source information society from beginners to advanced’ in the Hungarian education; The possible roles of Moodle in the Hungarian teacher training (Survey Report of ISERC 2007, SZIU FAPA ISERC)
- [5] Robert Sinka: Primary School Teachers in the Information Society (JUCS 2006, issue 09.; http://www.jucs.org/jucs_12_9/primary_school_teachers_in/jucs_12_09_1358_1372_sinka.html)
- [6] Robert Sinka: ‘Open source information society’ in the Hungarian higher education, (Conference paper – Digital Communities 2007, 08-12, July 2007. Tallinn, Estonia – Helsinki, Finland)
- [7] Sinka, Robert (2004): Gondolatok az információs társadalom földrajzi diskurzusához (in: 40 years old the University of Szeged Department of Economic and Human Geography, Szeged 2004. pp193-198)
- [8] Hodgins, W. (2000). Into the future: a vision paper. For the American Society for Training and Development (ASTD), and the National Governors' Association (NGA). Commission on Technology and Adult Learning. Available: <http://www.learnativity.com/download/MP7.PDF>
- [9] Rachel Cohen (2003): Changes in education at the time of internet galaxy. Available: http://perso.orange.fr/rachel.cohen/articles_texte_html_esp/art_internet_galaxy.html
- [10] Gyula Papp (2007): Electronic curricula, teacher and student textbook (manuscript)
- [11] Papp Gyula - Vágvölgyi Csaba (2004.): Szabad forráskódú elearning keretrendszerek összehasonlító elemzése, Informatika a felsőoktatásban 2005. (<http://agrinf.agr.unideb.hu/if2005/kiadvany/papers/B43.pdf>)
- [12] Martin Dougiamas (1998): A journey into Constructivism (<http://dougiamas.com/writing/constructivism.html>)
- [13] Papp Gyula (2007): ePortfolio megoldások, Summer University in Information Technologies in Agriculture and Rural Development (<http://odin.agr.unideb.hu/su2007/presentations.php>)
- [14] Z. Karvalics, László (2002): Az információs társadalom keresése, Infonia-Aula Kiadó, Budapest 2002

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