



Information Technology

THE POSSIBILITIES OF E-LEARNING, BASED ON MOODLE SOFTWARE PLATFORM

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ABSTRACT

The report presents one aspect of the science research project titled “The Distance education in Bulgaria: Opportunities and advantages for their application in Technical College – Yambol”. The purpose of the paper is to show E-learning process of education by Moodle software platform and their realisation in Technical College – Yambol. E-learner is a way to use a variety of computer and networking technologies to access (often geographically remote) training materials, interact with learners, etc, with the management system for education. To achieve that technical and material base, methods for computer and electronic education usage, standards for the creation of electronic course and multimedia textbooks and trained staff are needed for its realisation. The results of the implementation of Moodle contain courses in Informatics, Programming languages and Information technology. The implementation of the information and communication technology in education with e-learning management system allows improving effectiveness of the education. The Management System of Education allows better cooperation among the learners, the tutors and the students. The accessibility, usability and student collaborative learning are improved. Higher motivation among the students and the teachers is achieved.

Keywords: e-learning, Moodle, course organisation, lesson, quiz, workshop.

INTRODUCTION

E-learning is a process of education in electronic form through Internet network or the Intranet with the use of management system for education. To achieve that technical and material base, methods for computer and electronic education usage, standards for the creation of electronic course and multimedia textbooks, trained staff for its realisation are needed.

Classes take place online through the use of software packages that have special classroom features such as discussion forums, calendars, "chat rooms" where participants can communicate in real time with one another, with quiz and polling capabilities. Files, such as word processing documents, sound files, pictures, and videos can be uploaded to the virtual classroom for viewing by students. Thus, the "platform" is essentially a place that looks like a private website and is intended to work like an electronic classroom. The classes taught on these platforms are

accessible via the Internet, and are usually private, meaning that only individuals who are registered for the class can see the password-protected website. A platform for online courses may also be called an LMS (Learning Management System) or LCMS (Learning Content Management System)”[1].

The process of e-Learning can be represented in the following e-Learning cycle model.

- Skill analysis. The learning manager analyses the learner's present skill and skill that is set as a learning goal, and obtains the necessary material information. The manager then searches for the related material (registered for the search).
- Material development. The developer creates exercise questions and the material structure (table of contents) linked with explanatory pages.
- Learning. The learner engages in learning that is suited to the need, that is, individual learning for knowledge acquisition, or collaborative learning for workshop-type learning.

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- Evaluation. The learner carries out exercises and takes examinations using questions designed according to the learning goal. The learning manager makes the evaluation of each learner, using results of exercises and examinations.

Each phase of the cycle is related with standards described above.

The most commonly used online class platforms in the United States are Blackboard and WebCT. However, they are far too pricey for small schools, companies, and individuals who wish to host online courses. Fortunately, there are a number of free platforms available for online courses. In addition to being free, these platforms are also top quality, and one could argue that some of them are, in fact, better than Blackboard and WebCT. Most are also arguably more adaptable than commercially available platforms.

There are two types of free platforms for online learning. First, there are those hosted on a public site. This means that the user just signs up and uses the platform, but the platform "lives" on a server somewhere in cyberspace. The second type of platform is those that must be downloaded (saved) and hosted on the user's own server.

The free online class platforms that must be hosted on your own server are "open source applications." This means that the software is available free for limited use under the terms of the GNU General Public License (GPL) [2]. This basically means that the user can copy it, distribute it, even charge for it, but cannot get patents on it. Also, the source code must always remain open and available for viewing by anyone looking at the site so that it does not become proprietary.

There is a concise comparison of the various platforms [1]:

- Moodle - <http://moodle.com/>,
- Fle3 Learning Environment - <http://fle3.uiah.fi>,
- The Manhattan Virtual Classroom - <http://manhattan>,
- sourceforge.net, ILIAS - <http://www.ilias.uni-koeln.de/ios/index-e.html>,
- ATutor - <http://www.atutor.ca>,
- dotLRN - <http://dotlrn.org>.

“The possible replacement system, Moodle, presents information in an easily accessible format that can be arranged by instructors to meet their specific needs. It includes discussion forums, quizzing functions and the

use of MP3 files.” [3]

One possible approach is to use the software platform Moodle which is Open Source Software. It works under Linux, UNIX, Windows and Mac OS X platforms, Apache web server, several database, include MySQL database and PHP language, that we prefer.

SOFTWARE TECHNOLOGY REALIZATION OF E-LEARNING

The word MOODLE, is an acronym for Modular Object-Oriented Dynamic Learning Environment. It is handy for an online course that has students all over the world. Moodle has many capabilities including forums, journals (private between student and teacher), quizzes, resources, and a section for displaying assignments. Teachers have access to full user logging and tracking, and assignments are date-stamped when uploaded to the server, making class management in cyberspace more user-friendly. Teacher feedback can be appended to assignment pages. Discussions can be viewed nested, flat or threaded, oldest or newest first. Moodle displays a photo of the person writing the message, right next to the message (the user has to upload his/her own photo once during setup).

Currently there are 6429 sites from 137 countries, which have registered by using Moodle. Currently there are language packs for over 60 languages [4].

Moodle is a Course management system (CMS) - a software package designed to help educators easily create quality online courses. Such e-learning systems are sometimes also called Learning Management Systems (LMS) or Virtual Learning Environments (VLE).

For an effective, widely used e-Learning environment, standardization in various aspects of e-Learning is required. The following are a few examples of widely accepted standards and specifications [4].

SCORM [5] (Sharable Content Object Reference Model) is a standard specification for Web-based Training contents, developed by ADL (Advanced Distributed Learning) in the United States. Compliance with SCORM enables materials to run on different LMS, and to use SCOs (Sharable Content Objects) in different course structures. A certification program that certifies whether LMS and contents comply with SCORM, is run by ADL, and the internationalisation of the program is being considered. SCORM

Version 1.3 is currently being developed, integrating IMS Simple Sequencing Specification to define the dynamic behaviour of contents accordingly to the learners' level and comprehension. SCORM defines Content Aggregation Model, Run-Time Environment and Sequencing and Navigation.

LOM (Learning Object Metadata) is a standard specification for metadata to define attributes of various resources (i.e., learning object (LO)), in education and training. It is the index information to search and reuse LOs. By creating a list of LOs, it is possible to classify and select LOs depending on the types of education, and to systematize LOs accordingly to a curriculum.

QTI (Question and Test Interoperability) is a specification for a question database for exercise and test questions. QTI specifies the question format, answer format, and grouping method for exercise questions. This standard is expected to facilitate the creation of questions for certification examinations and prep examinations, and to promote distribution of these examination questions.

LIP (Learner Information Package) is a specification that defines the attributes of the learners. LIP standardizes the format used in exchanging learner information between systems. The dynamic generation system for the curriculum can be constructed accordingly to each learner's learning objective and learning situation by using the learner information, including learning objective, learning history, competency, and the curriculum information described in LOM.

IMS develops and promotes the adoption of open technical specifications for interoperable learning technology. Several Instructional Management System (IMS) specifications have become worldwide *de facto* standards for delivering learning products and services. IMS specifications and related publications are made available to the public at no charge [6].

Moodle is a template-based system to which content must be added. This makes Moodle's interface very intuitive and allows for easy navigation. The whole page is presented in a "flat view" format. It is laid out in small blocks and organized around sections following a topic or weekly outline. Each section has its own tools such as lessons, quizzes, assignments, and forums which are all linked to a built-in grade book (see section on assessment below). All blocks on a page can be individually arranged, and the elements within each section can be easily moved

around or be hidden [7].

Moodle is based on the social constructivism pedagogy, which relates to contemporary achievements for increasing interaction among students. Moodle includes 15 modules – Activity, help and discussion: Assignment module, Attendance module, Book module, Chat module, Choice module, Database module, Dialogue module, Exercise module, Flash modules, Forum module, Glossary module, Hotpot module, Journal module, Lesson module, Questionnaire module, Quiz module, Resource module, SCORM Module, Survey module, WebQuest module, Wiki module, Workshop module [7].

Moodle has a number of features that are modular, including themes, activities, interface languages, database schemas and course formats. This allows anyone to add features to the main code base or to even distribute them separately.

Stability of the system and possibilities for working under different platforms

Moodle should run on the widest variety of platforms. The web application platform that runs on most platforms is PHP combined with MySQL, and this is the environment that Moodle has been developed in (on Linux, Windows, and Mac OS X). Moodle also uses the ADOdb library for database abstraction, which means Moodle can use more than ten different brands of database (Oracle, IBM DB2, Microsoft SQL Server, Borland Interbase, Informix, Visual Foxpro, SAP DB, SQLite, Sybase, Microsoft Access etc.). Moodle should be easy to install, learn and modify. Code reuse is instead achieved by libraries of clearly-named functions and consistent layout of script files. PHP is also easy to install (binaries are available for every platform) and is widely available to the point that most web hosting services provide it as standard. Moodle knows what version it is (as well as the versions of all plug-in modules) and a mechanism has been built in so that Moodle can properly upgrade itself to new versions. It should be modular to allow for growth. Moodle has a number of features that are modular, including themes, activities, interface languages, database schemas and course formats. This allows anyone to add features to the main code base or to even distribute them separately. It should be able to be used in conjunction with other systems. One thing Moodle does is keep all files for one course within a single, normal directory on the server. This would allow a system administrator to provide seamless forms of

file-level access for each teacher, such as Appletalk, SMB, NFS, FTP, WebDAV and so on. The authentication modules allow Moodle to use LDAP, IMAP, POP3, NNTP and other databases as sources for user information. However, there is more work to be done. Features planned for Moodle in future versions include: import and export of Moodle data using XML-based formats (including IMS and SCORM); and increased use of style sheets for interface formatting.

Simplicity and user-friendliness

There are some other features that would interest an educator. Moodle promotes a social constructionist pedagogy (which includes collaboration, activity-based learning, critical reflection, etc). It is suitable for 100% online classes as well as supplementing face-to-face learning. Moodle has a simple, lightweight, efficient, compatible, low-tech browser interface. Course listings show descriptions for every course on the server, including accessibility to guests. Courses can be categorized and searched - one Moodle site can support thousands of courses. Most text entry areas (resources, forum postings, journal entries etc) can be edited using a capable, embedded WYSIWYG HTML editor.

Good opportunities for communication during the course

A full teacher has full control over all settings for a course, including restricting other teachers. Choice of course formats such as by week, by topic or a discussion-focused social format exists. Flexible array of course activities - Forums, Journals, Quizzes, Resources, Choices, Surveys, Assignments, Chats, Workshops is available. Recent changes to the course since the last login can be displayed on the course home page - helps give sense of community. Most text entry areas (resources, forum postings etc) can be edited using an embedded WYSIWYG HTML editor. All grades for Forums, Journals, Quizzes and Assignments can be viewed on one page (and downloaded as a spreadsheet file). Full user logging and tracking - activity reports for each student are available with graphs and details about each module (last access, number of times read) as well as a detailed "story" of each student involvement including postings etc on one page. Mail integration - copies of forum posts, teacher feedback etc can be mailed in HTML or plain text. Custom scales - teachers can define their

own scales to be used for grading forums and assignments, can be found. Courses can be packaged as a single zip file using the Backup function. These can be restored on any Moodle server.

Means for feedback and evaluation

Assignments can be specified with a due date and a maximum grade. Students can upload their assignments (any file format) to the server where they are date-stamped. Late assignments are allowed, but the amount of lateness is shown clearly to the teacher. For each particular assignment, the whole class can be assessed (grade and comment) on one page in one form. Teacher feedback is appended to the assignment page for each student, and notification is mailed out. The teacher can choose to allow resubmission of assignments after grading (for regarding).

Summary of the work and progress of the students during the course.

Flexible array of course activities - Forums, Journals, Quizzes, Resources, Choices, Surveys, Assignments, Chats, and Workshops, exists. Recent changes to the course since the last login can be displayed on the course home page - helps give sense of community. All grades for Forums, Journals, Quizzes and Assignments can be viewed on one page. Full user logging and tracking - activity reports for each student are available with graphs and details about each module (last access, number of times read) as well as a detailed "story" of each student's involvement including postings, journal entries etc on one page. Mail integration - copies of forum posts, teacher feedback, etc, can be mailed in HTML or plain text. Custom scales - teachers can define their own scales to be used for grading forums, assignments and journals. Courses can be packaged as a single zip file using the Backup function. These can be restored on any Moodle server.

The user management goals are to reduce admin involvement to a minimum, while retaining high security. Moodle supports a range of authentication mechanisms through plug-in authentication modules, allowing easy integration with existing systems. Administrator can specify which fields to use. It maintains standard email method: students can create their own login accounts. Email addresses are verified by confirmation. If you are using email authentication, this is the period within which a response will be accepted from users. After

this period, old unconfirmed accounts are deleted. We can use LDAP method: account logins can be checked against an LDAP server; IMAP, POP3, NNTP: account logins are checked against a mail or news server. SSL, certificates and TLS are supported; External database: any database containing at least two fields can be used as an external authentication source.

Each person requires only one account for the whole server - each account can have different access. Administrator can configure variables that affect general operation of the site: an admin account controls the creation of courses and creates teachers by assigning

users to courses; a course creator account is only allowed to create courses and teach in them; teachers may have editing privileges removed so that they cannot modify the course (eg for part-time tutors). For the security of the site teachers can add an "enrolment key" to their courses to keep out non-students. They can give out this key face-to-face or via personal email etc. They can enrol students manually if desired and can unenroll students manually if desired; otherwise they are automatically unenrolled after a certain period of inactivity (set by the administrator).

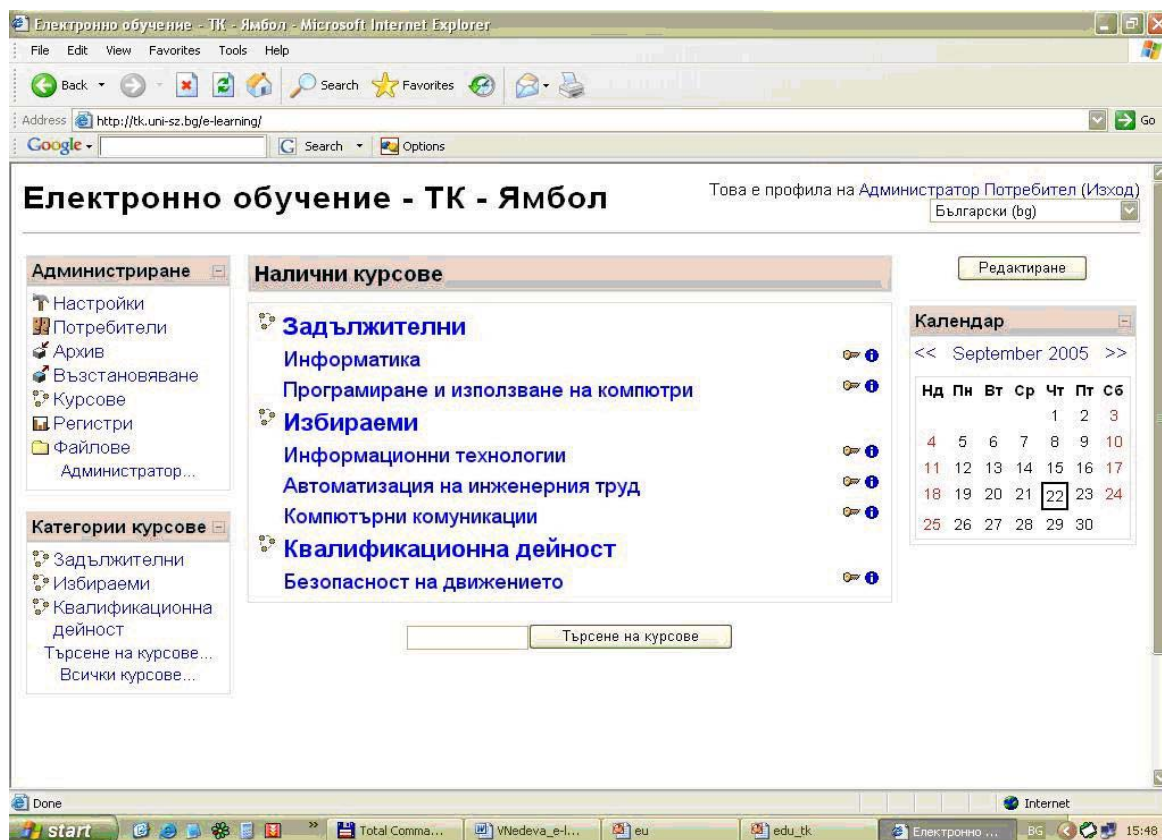


Figure 1. The screen shot of the administrative services

DISCUSSION AND RESULTS: THE CREATION OF THE STUDENT COURSES

The architecture of Moodle is compatible with the hardware and software of Technical College – Yambol. The incorporation of LMS will be done during the building and use in Intranet network. We work on the creation of Informatics courses, Programming languages and Information technologies. We create lessons according to the international requirements for e-learning – SCORM and IMS, according to the recommendation of the administrator of Moodle (Figure 1). The teacher has the freedom to change the courses, something the other users (teachers) do not

have. Because we prepare the lessons we equally make the quizzes. Each of them includes materials of one or several themes. There are three different formats for the class (course) – Weekly, Topic, and Social. The weekly format organizes the class into weeks, with assignments, discussion boards, tests, etc, all residing in a week-by-week block. The Social format is built around a forum (bulletin board), which is good for announcements and discussions. The Topic format organizes everything by topics (or units), regardless of how long they take. Our courses are in topic format. They are used for e-learning by our students, who use the resources of their home PCs by logging into <http://tk.uni-sz.bg/e->

learning/.

Course management can be changed from lecture (teacher) and administrator. They have full control over all settings for a course, including restricting other teachers. Activities in Moodle are educational things to do. They include Flexible array of course activities comprising: Forums, Quizzes, Resources, Choices, Surveys, Assignments, Chats and Workshops. All grades for Forums, Quizzes and Assignments can be viewed on one page (and downloaded as a word or excel spreadsheet file). Full user logging and

tracking - activity reports for each student are available with graphs and details about each module (last access, number of times read) as well as a detailed "story" of each student involvement including postings etc on one page. Mail integration - copies of forum posts, teacher feedback etc can be mailed in HTML or plain text. Teachers can define their own scales to be used for grading forums and assignments. Courses can be packaged as a single zip file using the Backup function. These can be restored on any Moodle server.

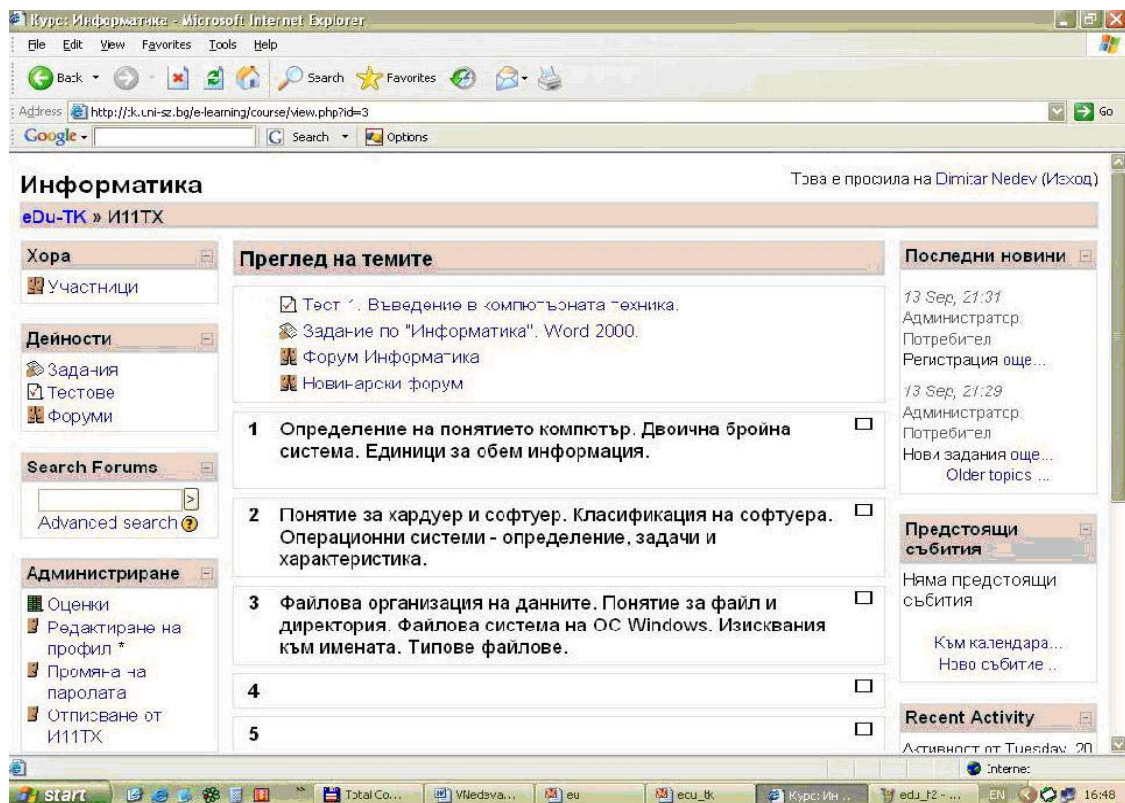


Figure 2. The screen shot of the Informatics course – quiz view

The Lessons module is exactly that - lessons you develop and post online for your students to navigate. Questions at the end of each page in a lesson can be multiple choice, true/false, short answer, numerical, matching, and essay. As an example, to create a question page you would decide on the type of question, give the page a title, add page contents (for example, ask the question), provide the answer(s), include feedback to be displayed depending on the student's answer, and also supply a "jump," to where the student should go next depending on the answer given. [8].

Lesson Module organizes the work of the student in this way:

1. The Scholastic work consists of pages and each page ends with a question. The Question has one correct answer and several wrong answers;
2. The Teacher sees the scholastic work as set of the pages in logical sequence;
3. The Students see the pages in order of the navigation, which allows them to examine the pages in non-logical sequence;
4. The Correct answers allow going to the following page, but wrong return on the current;
5. The Estimation for scholastic work is formed as correlation between the amount of correct answered questions and the amount pages viewed;
6. The Student is allowed several attempts to turn over his scholastic work, the total estimation for the scholastic work is formed as average of all attempts or as the best from all attempts (the teacher defines the method for the

- calculating of the total estimation);
- Scholastic work can be used for check the students knowledge or mastering the scholastic material.

The Lesson module in Moodle allows a series of pages to be entered. Each page can have a question at the end and, depending on the answers a student gives, can lead them to any other page. We create the Lesson activity for three courses: Informatics, Programming languages and Information technologies.

Teachers can define a database of questions for re-use in different quizzes (Fig.2). Questions can be stored in categories for easy access, and these categories can be "published" to make them accessible from any course on the site. Quizzes are automatically graded, and can be re-graded if questions are modified. Quizzes can have a limited time

window outside of which they are not available. At the teacher's option, quizzes can be attempted multiple times, and can show feedback and/or correct answers. Quiz questions and quiz answers can be shuffled (randomised) to reduce cheating. Questions allow HTML and images. Questions can be imported from external text files. Quizzes can be attempted multiple times, if desired. Attempts can be cumulative, if desired, and finished over several sessions. Multiple-choice questions supporting single or multiple answers include: Short Answer questions (words or phrases); True-False questions; Matching questions; Random questions; Numerical questions (with allowable ranges); Embedded-answer questions (cloze style) with answers within passages of text; Embedded descriptive text and graphics.

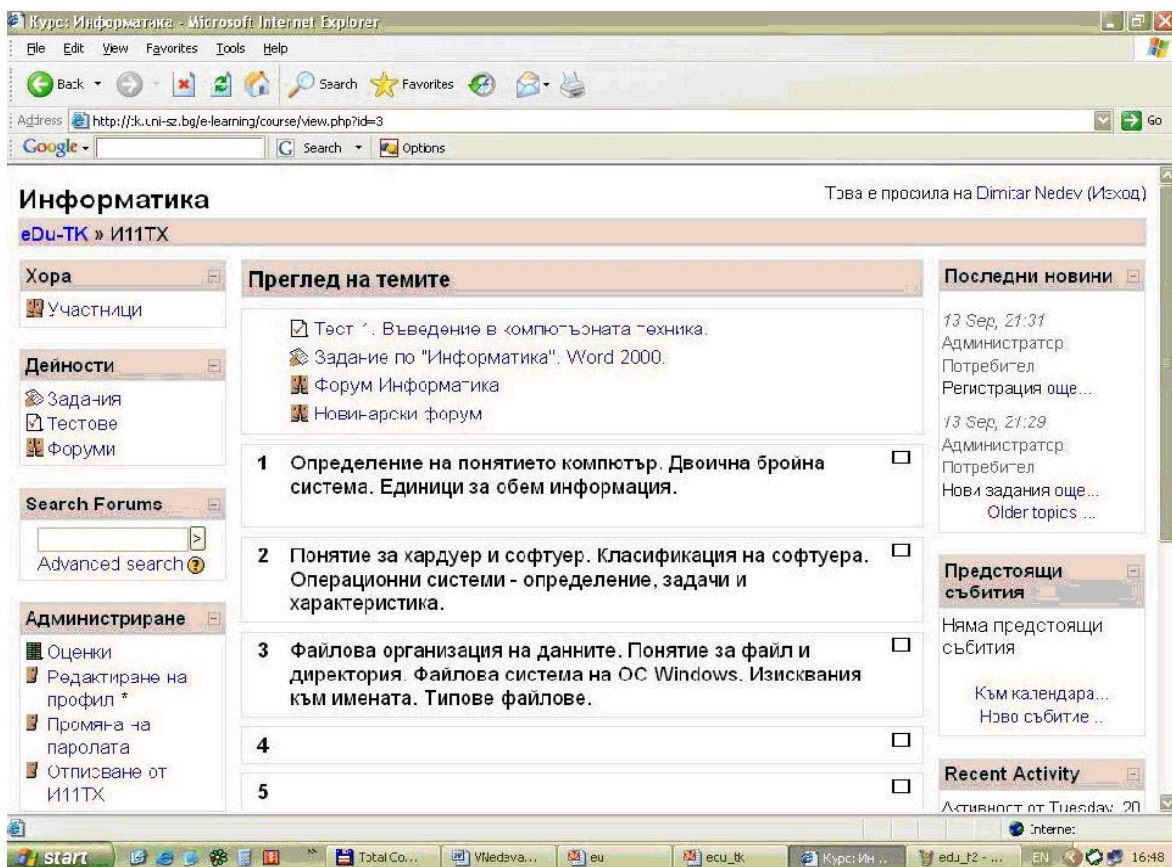


Figure 3. The screen shot of the Informatics course – student view

Allows peer assessment of documents, and it can manage and grade the assessment. It supports a wide range of possible grading scales. Teacher can provide sample documents for students to print. Grading is very flexible with many options. Teacher and student can view a complete report about activity of the student for each of the items.

After the teachers go through training for preparation of e-learning courses it helps them to focus on the experiences that would

be best for learning from the learner's point of view, rather than just publishing and assessing the information they think they need to know. It can also help the teachers realise how each participant in a course can be a teacher as well as a learner. Their job as a 'teacher' can change from being 'the source of knowledge' to being an influencer and role model of class culture, connecting with students in a personal way that addresses their own learning needs, and moderating discussions and activities in a

way that collectively leads students towards the learning goals of the class. Obviously Moodle does not force this style of behaviour, but this is what it is best at supporting. In future, as the technical infrastructure of Moodle stabilises, further improvements in pedagogical support will be a major direction for Moodle development.

In Technical College – Yambol we use e-learning to do base for the distance education. It required formalization approach in course curriculum. In the references there are used terms such as subject, course etc.

Quiz module allows the teacher to design and set quiz tests. Each question has a category. When you create a new question, it is stored in the category you select. To create a new question, you must select the type of question you want from the pull-down menu. You have the option of adding, which includes: Multiple choice questions; True/False questions; A short answer question; A numerical question; Matching question; Description question; Random set; Random short answer; A special embedded question (Cloze). These questions are kept in a categorized database, and can be re-used within courses and even between courses. Quiz module includes grading facilities.

The other activity is Glossary. It offers the Learners opportunity to create and maintain a list of definitions, like say a dictionary of terms specific to course content. The Glossary can be separate for each course or thematic. The students can be searched or browsed in many different formats (**Figure.3**). It is possible to automatically create links to these entries from throughout the course.

CONCLUSIONS

In conclusion we can say that the

implementation of the information and communication technology in education with e-learning management system allows improving effectiveness of the education. The Management System of Education allows better cooperation among the learners, the tutors and the students. The accessibility, usability and student collaborative learning are improved. Higher motivation among the students and the teachers is achieved.

REFERENCES

1. Kameron, Saskia E., A Review of Free Online Learning Management Systems (LMS), TESL-EJ, ISSN 1872-4303, vol.7, No.2, M-2, <http://www-writing.berkeley.edu/TESL-EJ/ej26/m2.html>.
2. Nag, Aditya, (May 24, 2005), Moodle: An open source learning management system.
3. Teacher Manual, (2004), <http://moodle.org/mod/resource/view.php?id=3864>.
4. Williams, Bryan, (Sep 1, 2005) Moodle 1.4.3 For Teachers & Trainers, http://moodle.org/file.php/29/English_Manuals/Moodle_1.4.3_For_Teachers_and_Trainers.pdf
5. <http://www.moodle.org>
6. <http://www.adlnet.org/index.cfm?fuseaction=scormabt>
7. Terherst, Adrienne, (May 2, 2005), New System Moodle More Effective
8. Branzburg, Jeffrey, (Aug 15, 2005), How To: Use the Moodle Course Management System, <http://www.techlearning.com/story/showArticle.jhtml?articleID=168600961>.