

## DEVELOPMENT OF THE E-LEARNING SYSTEM FOR THE TECHNOLOGY SCHOOL “ELECTRONIC SYSTEMS” ASSOCIATED WITH THE TECHNICAL UNIVERSITY OF SOFIA

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*The latest information system developed for the Technology school “Electronic systems” associated with the Technical university of Sofia is based on CMS Moodle. By development of the new system shortcomings found at previous developed information systems were considered. The system is based on Content management system (CMS) Moodle and MySQL database. It offers a wide variety of e-learning management and communication tools. To the original CMS system is added new functionality which adapts the system completely to the purposes of Technology school “Electronic systems” associated with the Technical university of Sofia. This includes new global groups, import of users from XML files, process of ending a school year. All these features are described in details in report. The changes made to the original system turn it into complete and fully functional information system that can be implemented trouble-free in Technology school “Electronic systems” associated with the Technical university of Sofia.*

**Keywords:** E-learning, Information system, Education, CMS

### 1. INTRODUCTION

Nowadays information systems at schools are not a luxury but necessity. The advantages that e-learning gives [4] and traditional education’s problems – lack of enough time and rooms, absence from school and many others turn the e-learning into indispensability [1].

Three different information systems for the purposes of Technology school “Electronic systems” associated with the Technical university of Sofia (TUES) have already been developed. One of them is currently implemented. All of the systems, however, have some disadvantages that prevent their regular use.

By development of the latest information system for TUES requirements, laid in [2] and [3] are concerned, as well as disadvantages of previous developed systems [2]. According to researches specialized CMS systems for e-learning appear to be most appropriate base for development of information system for TUES. During process of development of the information system several CMS systems for e-learning management have been analyzed with a view to their advantages and disadvantages related to current conditions of work in TUES.

One of the previous elaborations is based on Microsoft Class Server 3.0. This e-learning system however is not open-sourced and not very adaptive. It offers functionality that does not correspond completely to the needs of TUES. It is also

paid, as well as its updates, which make it inappropriate for most schools in Bulgaria, which have limited budgets.

Claroline 1.7.2 is an e-learning CMS that allows many features for administrating online courses. But it does not offer detailed statistics; methods for examination of students' knowledge are not fully functional. The 'teacher' user type has very limited access to administrative options for the course in which he or she teaches.

OLAT 4.0 and Docebo 3.0 are also difficult to adapt to conditions of work in TUES [7]. That is why CMS Moodle was chosen for base for information system of TUES.

## **2. INFORMATION SYSTEM OF THE TECHNOLOGY SCHOOL "ELECTRONIC SYSTEMS" ASSOCIATED WITH THE TECHNICAL UNIVERSITY OF SOFIA BASED ON CMS MOODLE**

### **2.1. Conditions of work in Technology school "Electronic systems" associated with the Technical University of Sofia**

The Technology school "Electronic systems" is associated with a university, which determines the specific conditions of work in it. Students in this school are divided into groups called 'classes'. They remain one and the same during years. Inside these groups however students are divided into additional groups according to their speciality. This affects different subjects (respectively courses) learned by these groups. Administrator of the system should be able to manually change the group to which a student belongs. Additional groups of students are created to reflect students that visit optional subjects. Every student can belong to several groups.

Administrator of the system decides which teacher to which course(s) must have access and should be able to change it at any time. Once specified, most but not all of the teachers of technical subjects teach at the same courses (for example one teacher teaches Informatics at 9<sup>th</sup> class, and another at 10<sup>th</sup>) in next years. Unlike them, most teachers of general subjects teach in particular groups at all classes (for example first year at 9<sup>th</sup> class, next year at 10<sup>th</sup> and so on).

Some of the teachers have to be able to create additional courses (these teachers have level of access 'authors').

### **2.2. Requirements laid at the information system**

Unique professional schools, such as Technology school "Electronic systems" associated with the Technical university of Sofia, have specific organization of work. Respectively, their requirements for e-learning system will be different.

Information system of TUES should support at least three types of users – administrator, teacher and student – each with specific access to system resources according to his role. The system should provide creation, edition and deletion of e-learning content as well as different methods for examination of students. Users without specific knowledge of HTML or other programming and/or scripting language should be able to use it. The system should offer a variety of methods for communication between users (student-student, student-teacher, teacher-teacher), such as forums and chats. The system should have simple text editor for creating

attractive web pages with an opportunity for inserting charts and graphics inside them. For the purposes of TUES it is required that the information system provides an opportunity to maintain and manage global groups (corresponding to different classes in school). Each global group should be able to be assigned to or removed from a course when required. Teachers and administrator(s) should be able to upload (respectively delete) files to the system. They should also be able to decide whether particular file or e-learning content is visible to students (and to which of them) or not. The system should have a module for admission of students.

A specific requirement is that the system supports a process for ending a school year and beginning a new one. During this process all active courses should be archived, new courses without e-learning content should be created. Students should change their global groups. They should be automatically enrolled in courses according to their new groups. This process should be automated.

The information system should provide Bulgarian user-friendly interface. It has to be open sourced, free to use, adaptive and easy for future development and addition of functionality subject to continuously changing conditions of work.

The primary purpose of this system remains making educational process more interesting and attractive to students as well as facilitating the work of teachers related to process of teaching and evaluating the results shown by students. In addition, the system should make communication between teachers, students and administration of the school easier, providing options such as creating news, forums, chats, etc.

### **2.3. Structure and functionality of the information system**

The structure of the information system of TUES has the following basic modules – official part, admission of students, categories of users (guests, students, teachers, authors and administrators); e-learning system (including e-learning resources and test and assessment tools) and software and hardware resources (Fig. 1).

#### **2.4. CMS Moodle 1.5.4**

Moodle is an open source e-learning platform. It has a very large user base with 13,909 registered sites in 158 countries with 4,972,676 users in 455,685 courses (as of August 2, 2006). More than 70 languages are supported. Moodle is a software package designed to help educators create quality online courses. [5]

Moodle offers 5 types of users (administrator, teacher, author, student, guest as shown on Fig.1). It has many different modules for creation, edition and deletion of e-learning content. Most important are: forum, chat, lesson, test, glossary, assignment, journal, survey, workshop, wiki, SCORM, exercise, dialogue and others. Moodle also offers a variety of resources for creation of course web page (text, web page, link to file/ web site, ftp function for uploading and viewing uploaded files and folders, label and others. [6]

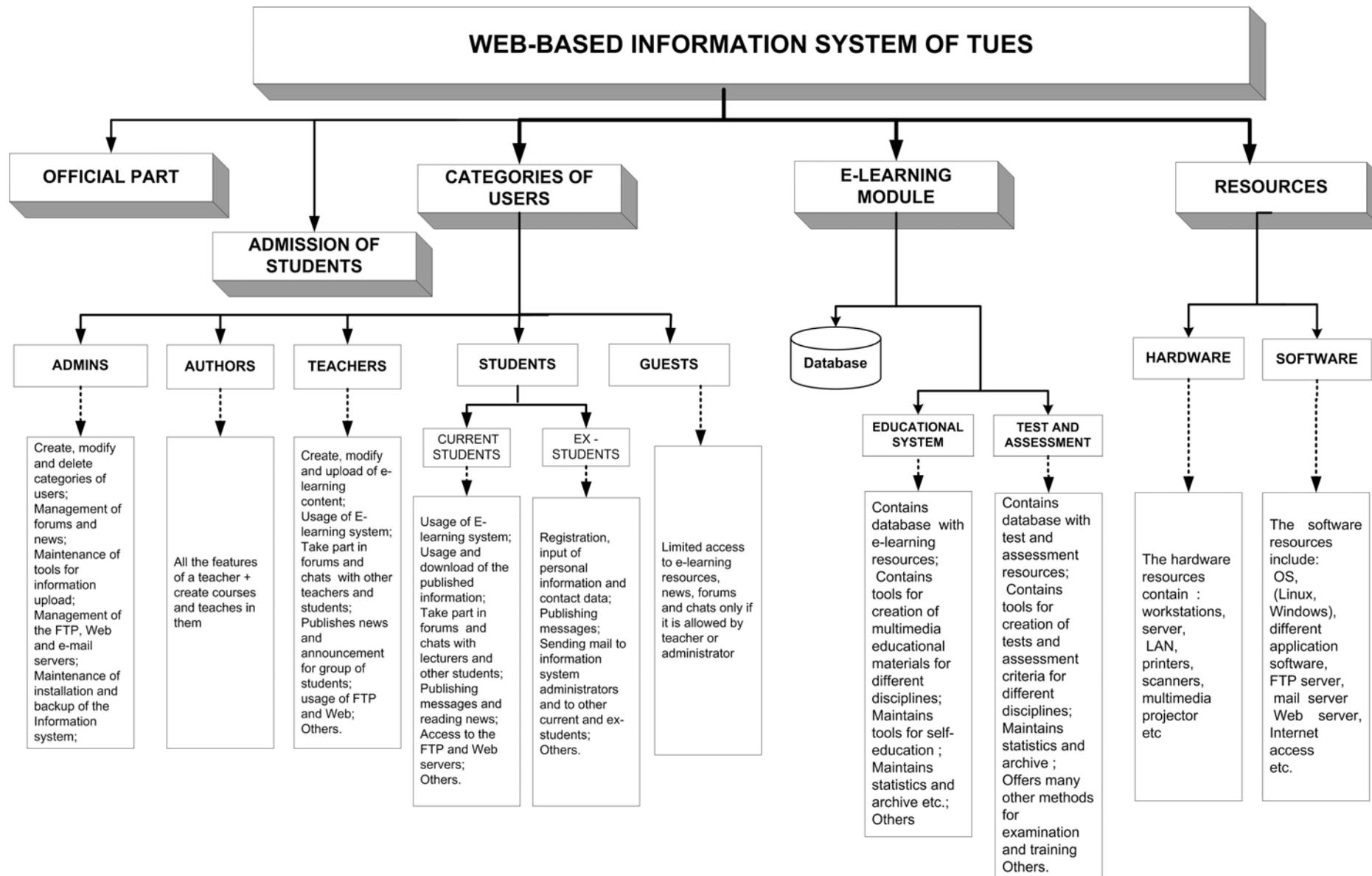


Fig. 1 – Information system of TUES – structure and functionality

### 3. DEVELOPMENT OF THE E-LEARNING SYSTEM

No matter that the CMS Moodle has undoubted advantages, it has also several disadvantages, that prevent it to be directly implemented for the purposes of TUES. That is why the existing system Moodle 1.5.4 has to be modified in order to completely satisfy all the requirements laid by TUES. The disadvantages include:

- Moodle supports groups with local meaning only. These groups exist only for a particular course and do not have global meaning
- Moodle does not support the process of ending a school year
- Moodle does not support upload of users from XML file
- Moodle allows archiving of a course but this can be done for a single course only and not for all courses as a whole

These disadvantages are avoided in the new information system of TUES.

For avoidance of the problem with local groups is used the fact, that the main site is a course with id number 1. The database contains the name of each group as well as id of the course to which this group belongs. All groups of site level are considered global. When a global group is enrolled to a course, information about that group is copied into local group for this course only, as well as its members. All changes made to global groups by administrator reflect to local groups too. Any changes made by teachers to local groups in particular course do not affect global groups.

The screenshot shows the front page of the ELSYS e-Academy system. The page layout includes a top navigation bar with the site name and a user status indicator. A left sidebar contains a main menu and a list of course categories. The central area features a large banner with the site logo and a quote, followed by a detailed list of course categories and their respective counts. A search bar is positioned at the bottom of this list. On the right side, there is a calendar for the month of May 2006 and a login section with input fields for a username (pre-filled with 'admin') and a password, along with a 'Вход' (Login) button and links for profile management.

Fig. 2 – Information system of TUES – front page

The information system offers a completely automated process of ending a school year that completely suits the laid requirements, including archivation of all active courses.

The necessity of importing students from XML file rather than from CSV file is conditioned by the fact, that the system is prone to errors if using Cyrillic symbols with CSV files. Such problems do not occur when using XML format.

A module, called 'Admission of students' is added to the system. It provides keeping and processing of candidates' data and their marks. This module calculates the final ranking. It allows automatic distribution of candidates in rooms for the exams. It provides methods for searching results from exams of a single candidate.

The information system has attractive user-friendly Bulgarian interface (Fig.2)

#### 4. CONCLUSION

The new developed information system completely suits all laid requirements.

The developed system is actually a complete and fully functional information system which can be implemented trouble-free in Technology school "Electronic systems" associated with the Technical university of Sofia. The added to the original Moodle e-learning system functionality allows the developed system to be used not only in TUES, but also in other high schools and universities in Bulgaria as it is easy adaptive and modifiable.

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