DATABASE STRUCTURE OF THE WEB BASED EDUCATIONAL SYSTEM OF TECHNOLOGY SCHOOL "ELECTRONIC SYSTEMS"

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In this paper the developed database modules for the purposes of the Web-based educational system for the Technology School "Electronic system" are presented. The main elements are the information materials, problems for solving, tests etc. based on the curriculum plan of the school. Another element is the students result accumulation. According to the goals of the Web based educational system and the experience in the Technology school the curriculum plan is the core and the unifying element of the database. In this plan the subjects to be studied are listed and the classes and terms are pointed. The structure frame for the subject material is proposed. For the section exercises the verifying of the student's answer should include not only the correct answer but also the proposed wrong answers – typical mistakes that comes to be useful for the individual approach to the student. In this paper an idea for the presentation of problems to be solved is developed and their structuring for the database is proposed. The students result accumulation is discussed from two points of view. The first point of view is the student's – the gathered results should help the student with further recommendations. The second point of view is that of the teacher – he needs the results of every individual in order to take the decision for the marks. From the other side the lecturer should be able to correct and to elaborate their lectures, exercises, tests and so on.

1. REQUIREMENTS TO THE DATABASE STRUCTURE

The modern education includes the usage of an e–learning system on a Web platform. The implementation of such system has a wide range of advantages for the educational process for the students and for the lecturers. The Technology School "Electronic systems" associated with the Technical University Sofia performs the education of students in two profiles: Programming and Information technologies and Computer technique and technologies. Different problems in the educational process /1/ make the e-learning system on Web platform a real necessity. The conditions for the implementation of such system are fulfilled. Some e-learning lessons, tests and presentations were developed and implemented at the school. The usage of these materials proved the advantages of that approach. The need of a unified system become obvious because of the following:

- the maintenance of one system is more profitable than the maintaining of several systems;
- the unified system supposes the usage of one database with the all advantages of this;

- the access of all lecturers to their own lecture materials, tests and so on as well as to the official administrative materials of the school in the meaning of the Internet based Information system of the Technology School "Electronic systems" will be the same;
- the access of the students to the different information materials, tests etc. in different subjects during their study at the school should proceed in the same way;
- the access level of the students to the different materials in different subjects should be précised from their grade and identification at the school;
- the visibility of lectures, exercises, tests should be defined in time by the appropriate lecturers during the educational year.

The main information needs (fig.1) for such unified Web based e-learning system /2/ for the Technology school "Electronic systems" are following:

- Presentation of information. The electronic presentation of lecture or additional material in the classroom is not unusual today. Putting it in the Web will ensure the access of all students at every time and place;
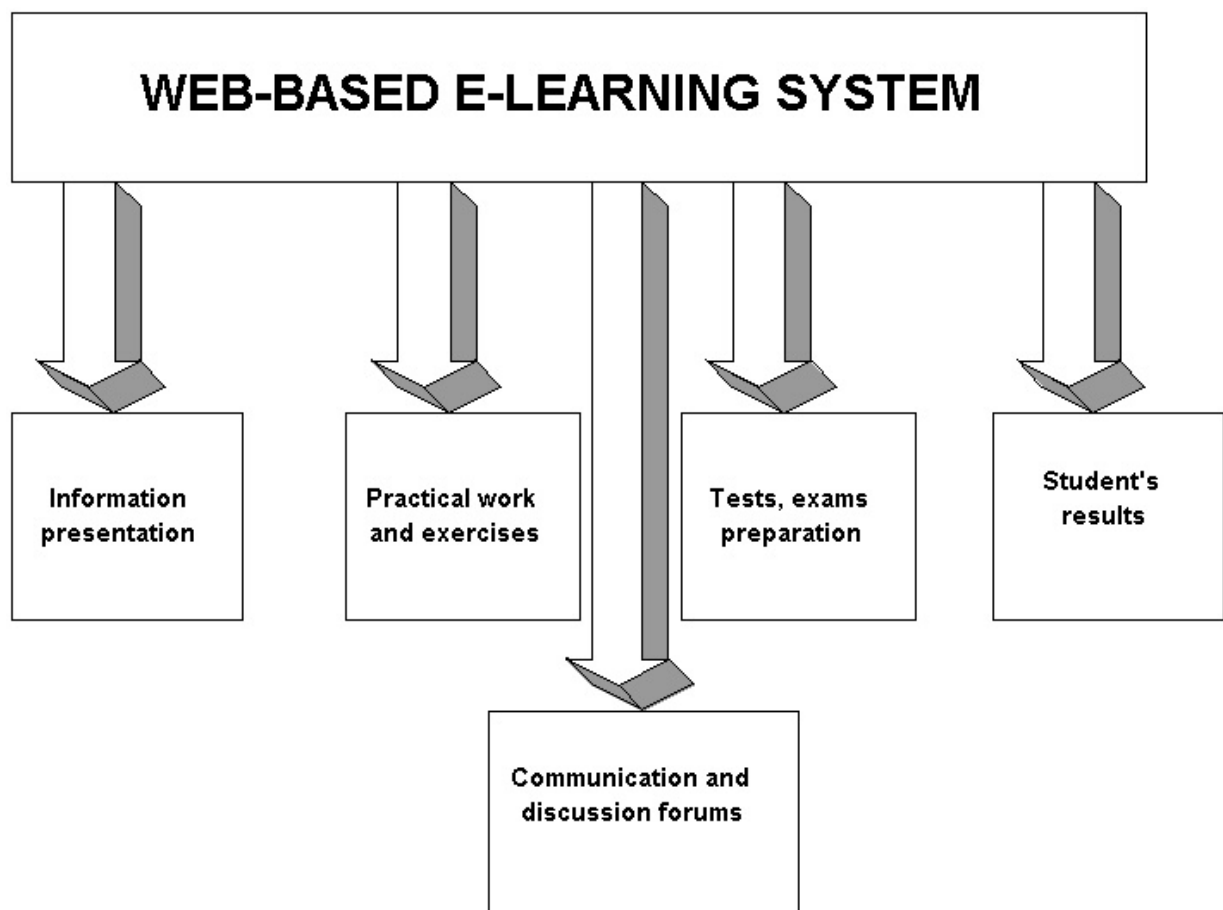

Fig. 1. The main information needs groups for the Web based e-learning system for the Technology school "Electronic systems"

- Practical work and exercises. The usage of interactive training for all students at every time and place;
- Tests and exam preparation. Control and self-control of knowledge and skills in the classroom and at home;
- Students' result accumulation.
- Discussion forums and communication facilities for all groups of users. This information flow will not be discussed in this paper.

2. CURRICULUM PLAN AND THE DATABASE STRUCTURE

Very important for the database modeling according to the listed information needs groups is the accepted principle that the usage of the e-learning system will be parallel to the traditional education and that the information delivery for the students will be partially teacher mediated and partially intended for independent self-study. That means that for one studied subject at the school there might be several different lectures included in the e-learning system on Web platform. These lectures could be connected with one another and they could be displayed in an ordered list for the student. But as the experience at the school proves that is not the case. That makes them differ from the developed e-learning courses. Very often the lecturers develop different parts from their lecture material in a different not orderly connected e-learning programs. Unifying of these materials in one system should be done in a systematic and consistent way. The studied subjects at the school are with different specific requirements, different features. The unifying corn of this list of subjects is the curriculum plan of the school. In this plan for each subject the relation (fig.2) to the grade and term when it is studied are pointed.
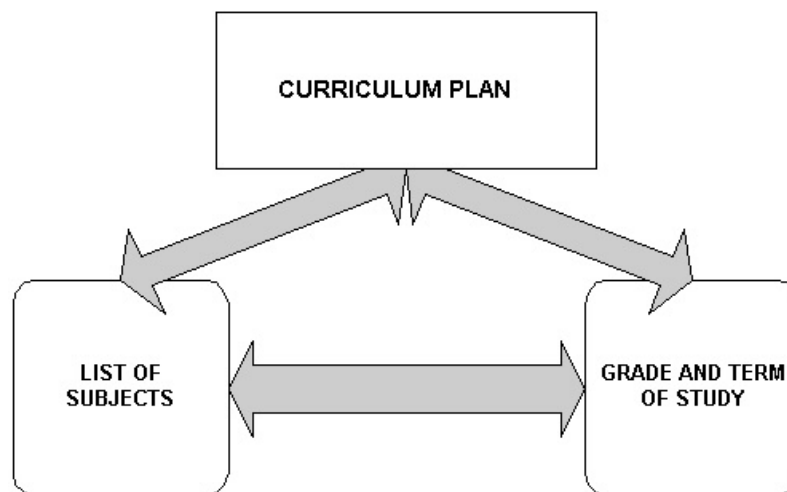

Fig. 2. The curriculum plan elements and relations

The database modules of the Web based e-learning system for the Technology school "Electronic systems" (fig. 3) according to the accepted principle that the unifying corn will be the curriculum plan from one side and from the other side the information needs groups for the educational process are as follows:

According to the goals of the Web based educational system and the experience in the Technology school the curriculum plan is the core and the unifying element of the database. The database module for the curriculum plan contains the data for the subject, grade and term. This module defines the structure containing the lecture materials, tests and exercises and statistics from the subject and he time it is studied point of view.
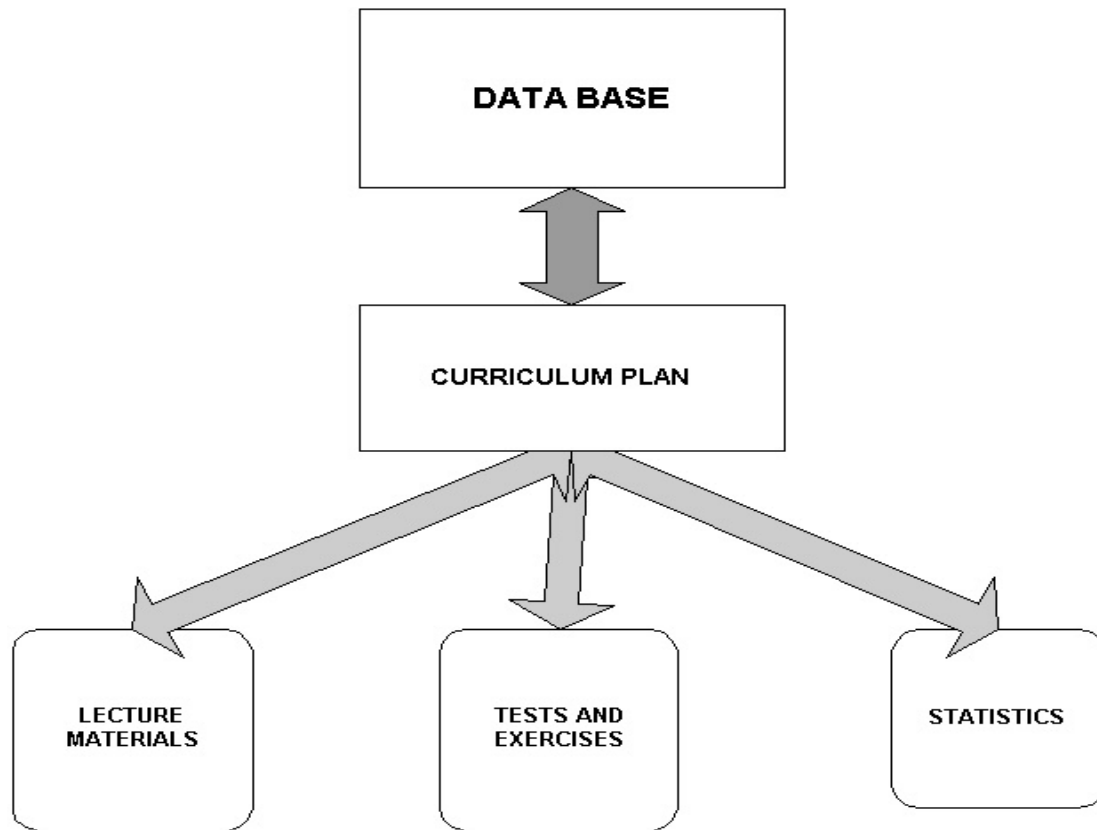

Fig. 3. Database modules of the Web based e-learning system for the
Technology school "Electronic systems"

The appropriate tables for the curriculum content will be the unifying corn of the database. For this purpose two tables are developed – one for the subject list and one for the relation between the subject and the grade and terms during which the subject is studied. The relation between these two tables is the subject identifying number. The content and the relation are shown on fig. 4.
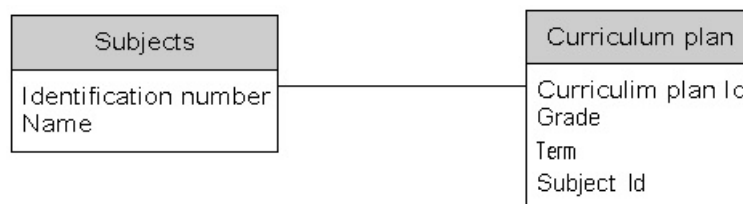

Fig. 4. The curriculum plan tables in the database

The lecture materials should have definite structure. For the Technology school "Electronic systems" the research among the lecturers for the studied subjects gave as

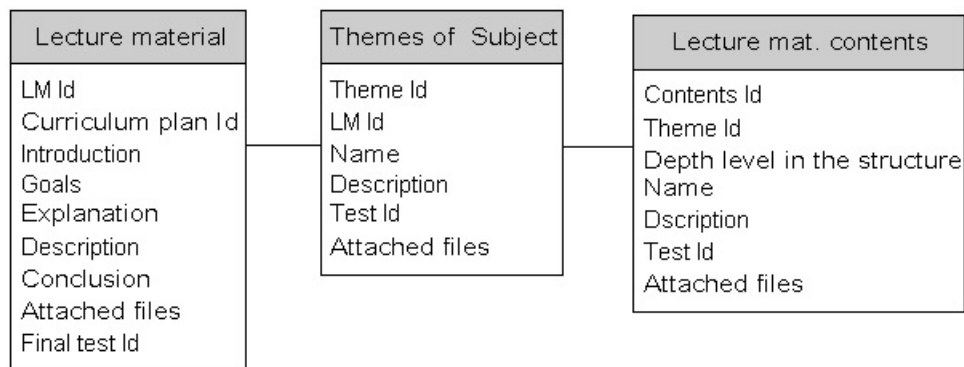result (fig. 5) that for each e-learning part of the lecture material the main elements are:

Fig.5. Lecture material in the database structure of the Web based e-learning system for the Technology school "Electronic systems"

- introduction into the subject, goals and explanations;
- themes included in the subject;
- lecture material with a different depth level of presentation due to the requirements of the navigation possibilities of the student;
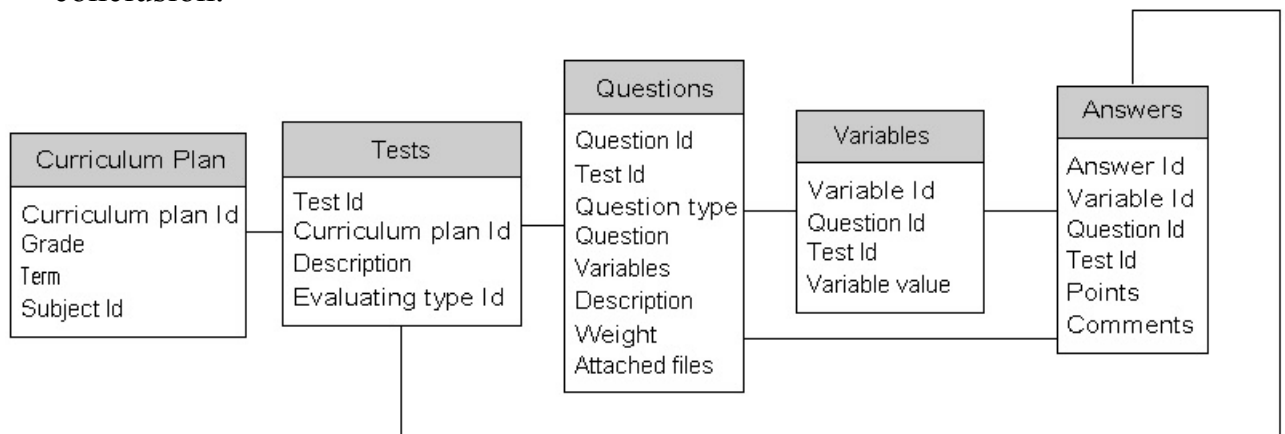- grade and term for the lecture material of the subject;
- conclusion.

Fig. 6. Tests and exam preparation in the database structure of the Web based e-learning system for the Technology school "Electronic systems"

The tests, exercises, problems for solving are developed with the following structure for the database:

- information and description part;
- exercises;
- problem solving;
- tests;
- final test;
- analyses of the achieved results.

The verifying of the student's answer should include not only the correct answer but also the proposed wrong answers – typical mistakes that come to be useful for the individual approach to the student – recommendations for further work. The problems to be solved are presented with variables, that take different values for the students (fig. 6).

The students result accumulation (fig. 7) has two points of view. The first point of view is the student's – the gathered results should help the student with further recommendations. The second point of view is that of the teacher – he needs the results of every individual in order to take the decision for the marks. From the other side the lecturer should be able to correct and to elaborate their lectures, exercises, tests and so on.
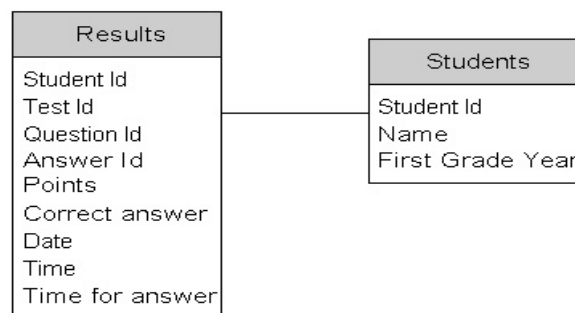

Fig. 7. Results accumulation in the database structure of the Web based e-learning system for the Technology school "Electronic systems"

3. CONCLUSIONS

The developed modules of the database structure are the base for the development of the additional tables for the entire Web based e-learning system for the Technology school "Electronic systems" and the usage of already developed and implemented systems such as the Internet based Information system for the Technology school "Electronic systems" and the integrated to it Knowledge and skills testing system. The developed data base structure acts as a framework for the development of the enhanced application. The aim is to incorporate gradually the subjects that are studied at the school and to help the teachers and the students in the educational process.

4. REFERENCES:

[1] Стоянова Л., *Структура на Web-базирана система за електронно обучение в технологическо училище "Електронни системи"*, Национална конференция ЕЛЕКТРОНИКА '2004, София, Май 2004

[2] Anido L., M. Llamas and M.J. Fernández. "*Labware for the Internet*". Computer Applications in Engineering Education, 2000.