

Training studying system of electrical disciplines for students with special needs

Yuriy BOBALO
Rector of Lviv Polytechnic National
University,
12 Stepana Bandery Str., Lviv,
79013, UKRAINE
rector@lp.edu.ua

Petro STAKHIV
Professor of Lviv Polytechnic
National University,
12 Stepana Bandery Str., Lviv,
79013, UKRAINE
spg@lp.edu.ua

Natalya SHAKHOVSKA
Professor of Lviv Polytechnic
National University,
12 Stepana Bandery Str., Lviv,
79013, UKRAINE
natalya233@gmail.com

Abstract – The architecture of educational and methodical complex for students with special needs is made by data space. The practical significance of computerized educational and methodological complex "Electrical Engineering and Electronics" is to create a modern information security training specialists training European level in the fields of electrical engineering and electronics involved in the process of creation, transmission, processing and storage.

Key words – a teaching complex, a virtual workshop.

I. INTRODUCTION

For distance learning is very important teacher-student relationship. At the scheduled date and time takes place online interaction between members of the educational process, during which a student with disabilities can find answers to unclear questions.

Additional requirements are demanded to distance learning system, which are made for students of engineering specialties and with special needs, because laboratory work on the stands is an integral part of training engineers, especially if they are students of electrical disciplines [1].

In addition, students with special educational needs have the opportunity to go ahead with an individual learning path, to set their own goals, to choose the optimal way of learning and to apply the methods of gaining knowledge that best meet personal needs.

II. THE MAIN MATERIAL

THE OVERALL STRUCTURE OF DISTANCE TRAINING AND CONSULTATION CENTER FOR DISABLED PEOPLE.

The main task of remote information technology training and Consulting Center for People with Disabilities (CCPD) is organizing and conducting full training process, thus combining information about students who have to perform natural experiments and laboratory work in different laboratories, to study theoretical material and self-control using the electronic textbook. It is also necessary to obtain information from the medical center to determine the features of one or another student and creating conditions for its study

(submission of reports, images, text, tactile tools, etc.). Additionally system can be used for remoting control of knowledge and become a didactic tool for self-training [2,5].

The overall structure of the complex for the distance training and consulting center shown in Fig. 1

The database combines educational material information from e-books and instructions for laboratory practical or independent work.

This system allows more determine the content and structure of training to ensure the realization of personal and active approach of learning; increase the efficiency of control by learning detailed diagnostic knowledge; develop new types of educational diagnostics.

For electrical training courses is necessary to provide all forms of employment:

- lectures,
- practical,
- laboratory,
- final exam.

Lecture classes form provides a full presentation of training material (study) or short calculations (self-study). Can be supplied in the form of text, video reports etc.

Practical studies suggest the aviability of theoretical material for explaining the principles of problem solving, identifying patterns, etc., and the use of automated tools of generation and checking the correctness of tasks and their solutions made by student.

Laboratory studies suggest the use of simulation, development environment, etc. for performance practical tasks and automated checking the correctness of the results obtained by the student.

Final test is used for evaluation of students' knowledge of theoretical and practical training. According to this tests with different levels of complexity are used(including variety of correct options), tasks (input answers from the keyboard), graphic tasks (drawing tools charts, graphs, etc.).

In order to meet the number of allocated credits and number of tasks is necessary to determine [4]:

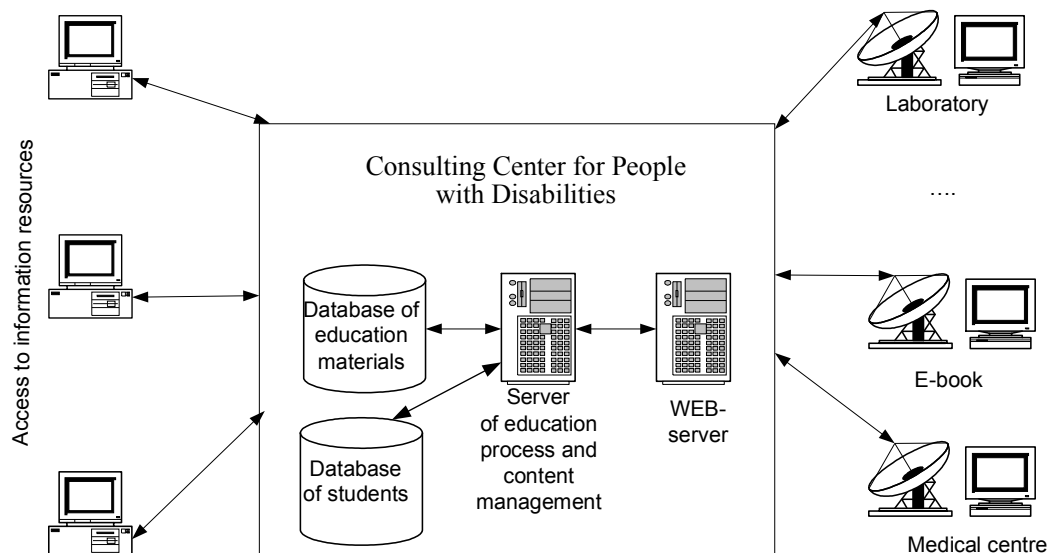


Fig. 1. The overall structure of education complex in CCPD

- time for passing the task of each type for each topic;
- time learning material;
- time for laboratory (practical work).

For people with disabilities is necessary to provide laboratory and practical work to study electrical engineering disciplines both in the laboratory and remotely

Virtual laboratory practice is a student interaction with the virtual laboratory equipment based on simulations of physical investigated processes. The software interface provides a interaction with students and the objects. Virtual labs for various reasons (inability to physically visit the laboratory, the complexity of the technical implementation of the experiment, the financial cost of its setting, etc.) can be conducted independently, without regard to physical experiments, or using their results to prepare physical experiment with real electric schemes with the possibility of optimal selection of parameters. Virtual experiment can also be used to customize by selecting tasks circuit parameters for each particular student to conduct more detailed research on the topic of schemes laboratory work. This is usually not possible to implement on the stands with fixed layouts of laboratory work.

To implement the proposed structure we created a computerized laboratory where a computer workstation equipped with versatile USB oscilloscope and physical layouts of the objects. In this mode, the lab involved with installed hardware and software for the simulation of analog electronic circuits, a database of training materials, training and management server content and Web-server. With established in the laboratory Web-cameras (one for 2-3 workplaces) teacher can observe the work of the student.

Administrative CCPD environment enables independent creation and administration of educational material and testing for the organization of control measures by many teachers. Designed system summarizes the specific institution and a

means for effective implementation of personalized distance learning and remote control of knowledge.

The peculiarity of designed CCPD is selection of ergonomic workplace student performance by analyzing his personal data, from medical records. Therefore, the data warehouse designed system should provide data structures for storage the medical records of the student.

Another important factor is the consideration CCPD is management of student learning outcomes in designing educational material feeding him.

The testing subsystem is based on the principle of dialogue "question and answer", and the answer is chosen from the list of options such ambiguous distributed. Some questions may provide the necessary background information and assistance.

THE ARCHITECTURE OF THE PROJECT

The overall structure of the center (Fig. 1) implies the existence of heterogeneous components:

- educational process management server (chosen Moodle),
- Web server (Apache with the database MySQL),
- Access points (client part, PHP),
- data sources are external databases and other information resources.

We must process information from different sources such as

- databases, text files, spreadsheets with information about students with disabilities from different universities;
- medical center database, which contains requirements for the workplace and how the organization of training people with disabilities.

That is why we use dataspace (DS) [7].

We use dataspace for the organization of work with heterogeneous information resources such as databases, text files, spreadsheets, programs for computer simulation. *Dataspace* is a set of information made available in different models (databases, data warehouses, static web pages, structured data, map data), local stores and indexes, as well as integration tools, search and processing of information, joint environment management models.

In this case, storage of consolidated data includes:

- sample of the lab database,
- if the lab has developed a database for the educational process, downloading data will be of spreadsheets.

The structure and interaction of the components is shown on diagram of components (Fig. 2). Relations between the individual components is minimized through the using of generalized interfaces and data exchange via events. Thus, we achieve easy replacement of individual components.

CONCLUSIONS

1. The architecture of remote training and consulting center for students with special needs is created. There is designed the scheme of data space for distance training and consulting center for students in order to preserve the data obtained from universities and medical facilities.
2. The approach to laboratory work on electrical courses improves skills and gain practical skills in the study of electromagnetic processes, and gain financial benefit by saving money to create a laboratory and methodological advantage in preparing students
3. The developed complex demonstrates a new approach to the teaching of basic subjects to study. It allows you to

combine all kinds of activities on the course "Fundamentals of the theory of electronic circuits" and used for teaching students with special needs

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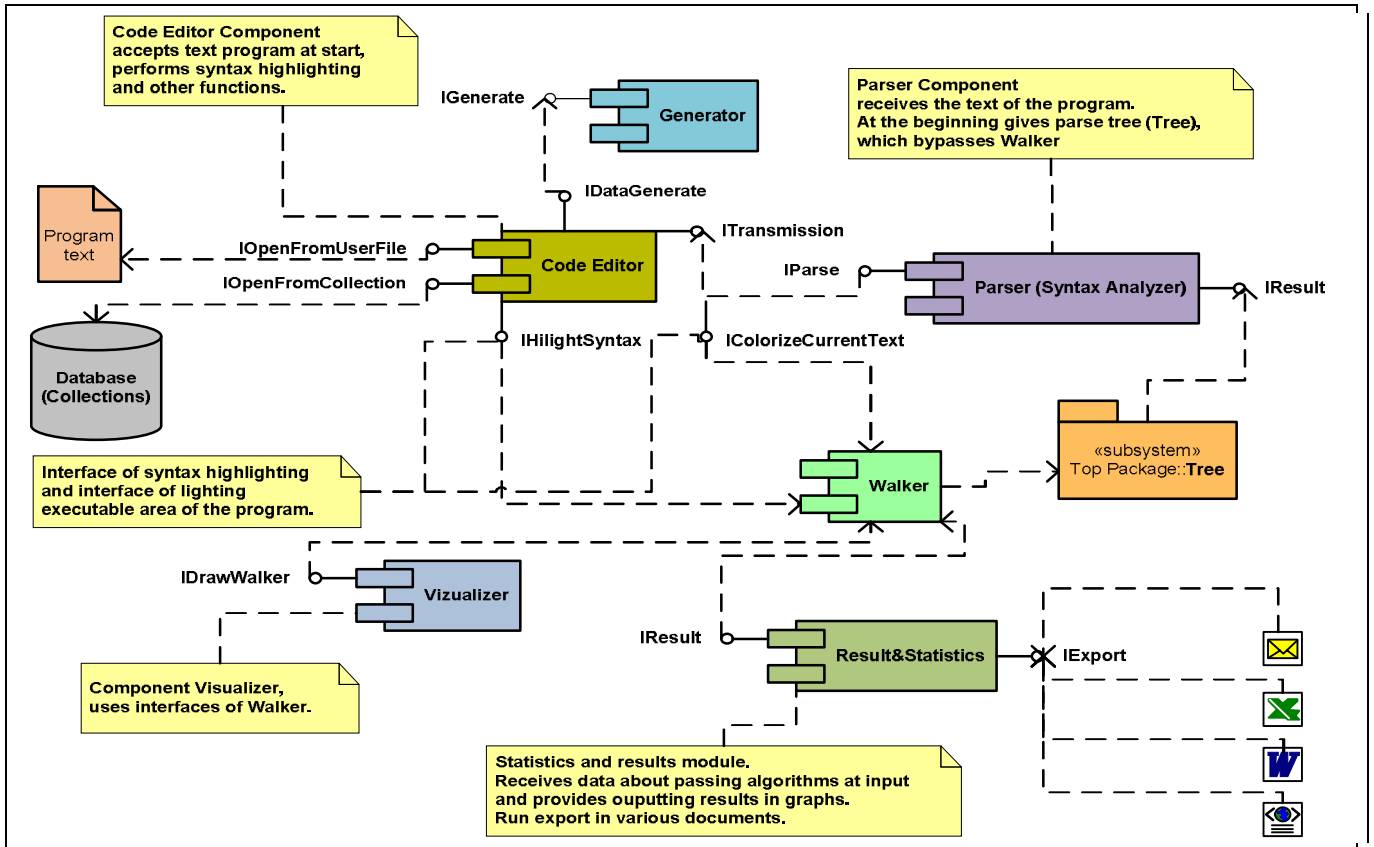


Fig. 2. Diarama of components