

ZINTEGROWANY SYSTEM NAUCZANIA

KARPOWICZ S., SORKO S.

Białystock polytechnics (Technical University), Białystok, Poland E-mail: svk@csie-data.com

DAINIAK I.

Software engineer of department for higher mathematics.
Belarusian State University of Informatics and Radioelectronics, Minsk
Tel.: (+375 17) 239-88-30 E-mail: dainiak@bsuir.unibel.by

Streszczenie:

W artykule przedstawiona została problematyka wyższej oraz specjalistycznej edukacji w aspekcie wsparcia systemowego w postaci komputerowych baz danych. Autorzy stworzyli koncepcję budowy interaktywnego, multimedialnego systemu nauczania opartego na sieci komputerowej, jego główne aspekty i problemy, na których należałoby oprzeć taki system. Przedstawiono strukturę takiego systemu oraz przedstawiono sposoby realizacji tego projektu.

Słowa kluczowe: sieć komputerowa, interaktywny system nauczania, struktura systemu

INTEGRATED TEACHING SYSTEM

Summary:

The problems of higher, secondary and special education, linked to computer-based training aids are at issue. The building concept of the network interactive multimedia teaching system is introduced, the main aspects and principles, on which it is based, are mentioned. The structure of the system is described; the ways of realization are presented.

Keywords: network, interactive teaching system, system structure.

1. INTRODUCTION

Nowadays the methodical education ensuring remains behind the possibilities of information technologies. This slows down the introduction of new modern methods of training into the system of education. The demands to the education had grown up and the information load of trainee is very great. Currently the opportunities of computer application for training aids creation and usage (learning-books and manuals) are not used at a great extent. New computer learning-books constitute often the electron version of printed books, or adapted polygraphic publications, which are being added with motionless pictures or moving pictures, illustrating the text, but having no independent educational meaning.

The present electronic learning-books [1...2] are oriented on definite categories of students, and they can not be effectively used in interdisciplinary levels of the education system. The modern computer technologies allow creating of multilevel educational systems that can be used by students in schools, secondary schools and universities and by engineers. This can be achieved thanks to the right structuring of educational material and to the right access organization to it by means of computer-based teaching system, what is practically unattainable with traditional learning-books.

It is necessary to create a system of elaboration and application of new computer-based learning books. For this purpose it is necessary to unite the efforts of specialists of different areas of knowledge (pedagogic, information technologies, other scientific spheres), and not only to create learning books that would have been the examples for imitations, but also to work-out the methodology itself and the technology of collective work over them.

Therefore the aim of the given work consists in the work out of the network interactive multimedia teaching system (NIMST) that allows to organize the learning of pupils, trainees and students (students of educational courses) with usage of Internet, but also working out of thematic databases of knowledge in different disciplines.

2. CONCEPT OF THE PROJECT

For up-to-date learning-books creation, which is suitable for self-teaching, distance learning or self-independent work without immediate teacher participation, it is necessary to put into their basis the new approach. On the one hand it is necessary to use the opportunities of modern computer technique (big information capacities of PC's and computer networks, animation, interactivity, multimedia, opportunity of editing, appending and refreshing of educational materials), on the other hand – to

provide the introduction of modern pedagogical technologies into the self-teaching process.

The suggested project of new educational system creation is directed towards the mentioned problems solving, for its implementation the principles of learning-books creation, the methods of material organization, which considerate the didactic peculiarities of self-independent work with computer educational systems and variants of information technologies for rational studies goals attainment usage, are being worked up.

The feature of suggested concept is in multimedia learning system environment development, which provides the work with information streams in virtual, program-based learning networks. It is a program complex, which controls the studies process and provides the access to the database of knowledge, which is found on divided servers in Intranet or Internet.

NIMTS consists of a special browser which is necessary for database of knowledge access and providing the interaction of multimedia learning system and user, and methodological navigator, which controls the user transference in the spheres of knowledge. In contrast to well-known learning systems, NIMTS provides the opportunity of flexible automated selection of educational material for any course, (schools, secondary schools and universities), which is formed of combined distributed database of knowledge of all partners. NIMTS gives the opportunity of quick permanent replenishment, refreshing, editing of educational material and finally will allow to realize the quick transition from traditional methods of training with preservation of their advantages to new little known, even unique, interactive methods of education, which will be based on modern computer technologies, high scientific and methodical level of educational courses creators, the experience of leading pedagogues of universities-consortium members.

The modern information technologies and the usage of Internet allow creating of fundamentally new educational systems that increase the information perception and strengthening. Multimedia technologies provide a very high level of interaction of user and computer, at the same time securing new possibilities in the education area. Moreover, owing to the Internet, new possibilities are opened for distance learning.

3. FUNDAMENTAL ASPEKTS AND PRINCIPLES

Traditional manuals and educational systems demand a long cycle of preparing, edition and approbation, but for all that the modification and addition of all manual is complicated. The new educational system will allow to realize the transition from traditional system to the new little

known based on the most popular information technologies. Fundamental theses of the new learning system conception are as follows:

1. Multimedia elements (modules) are situated on the server, and are combined into blocks of educational material. All modules are linked to each other into reprogrammable data network. The developed modules can be permanently modified by a creator, added into the system and included into the general index system.

2. The multimedia element (module) contains graphic, interactive and descriptive (textual) parts. Graphics and interactivity are dominant parts of educational material, as visual perception of a human is better developed, and a possibility to influence the input parameters and to observe the modifications of output parameters in real time improves the understanding of the material. The description part of multimedia element is auxiliary and promotes strengthening of information.

3. The «Many-tier» idea of information representation containing in cells that allows using the program by many users, pupils, students and engineers. For every complex theme of educational material is foreseen an opportunity to call cell-pages from other (basic) modules that contain the physical principles and laws, on which the following object is based. All called cells allow realization of interactive research in real time, which will provide the self-independent work of user on different levels of educational material, from complex to basic, explaining physical fundamentals.

4. Individual approach to every user. The server, on demand of user, forms block-module interactive electronic learning-book for a given theme in accordance with the theme of educational material and methodological principles and passes it to client computer for personal user work.

The efficiency of usage and refreshment. Small sizes of multimedia elements allow the user to start the work with the educational system straight away after loading of the first modules without waiting for loading of the others; for the authors it gives the opportunity of quick distribution in the system of new or altered educational material.

The experience of information search in the Internet conveys that while trying to receive the subject materials of a definite sphere it does not manage to achieve the satisfying results. Even using new “search machine” and rather high professional skills of user it takes too much time, and received information is either superfluous (the «outsider» spheres are caught) or is too short for the user. Thanks to special access organization and material structuring the suggested educational system allows to replenish the required and methodically organized educational information into one educational course for any educational level (schools, secondary schools, universities).

The presence of logically finished modules allows creating of flexible educational systems in a wide range of data domain. At the same time there is no need to create the totally full concrete system, as considerable part of educational material can be got out of already created modules and basic knowledge blocks. It is obligatory for concrete system to create the organizing program and navigator, and to work out the needed modules and blocks. The elementary modules and blocks of knowledge network can be created and completed by dozens of authors and pedagogical collectives who work in autonomous mode. The work of methodologists provides the data uniting of modules and blocks of knowledge network. As the model is a logically finished «elementary portion» of knowledge, the process of already worked-out modules modification, and the permanent addition to all the educational system, are lightened [3, 4].

To receive the needed internet learning-book, it will be enough to send the query from the client computer in the form of a string, which contains the needed theme of educational material. A server, after the processing a query, forms the internet learning-book on a demanded theme and passes it to a client computer.

4. PROGRAMM REALISATION

The basis of NIMTS is many-dimensional mobile network of knowledge which is represented by authors of project as conditionally-oriented graph, the vertexes of which are the elementary cells of knowledge, and the edges of which are semantic ties between them. Any educational course can be rated as the chain of elementary knowledge (cells of knowledge), which lead in the end to the studied object or phenomenon understanding.

NIMTS consists of the next modules:

- the storage of interactive multimedia cells;
- database of educational courses;
- methodical navigator;
- tracing system.

The working out of every mentioned module based on Internet - technology is envisaged. The modules are situated on the dedicated server in Internet and are available to users from any point of the world.

The realization of modules is supposed to be based on Web-server, database management system and one of environments of Internet-programming (PHP, ASP or Java). The realization of educational courses is supposed to be based on interfacing interactive multimedia pages, which consist of elucidatory text, pictures, needed links and interactive elements based on vector graphics. Every cell can contain several consistent pages, have animation and sound accompaniment [4].

The advantage of such educational system realization is its flexibility, adjustment, the ability of unlimited widening, by revision of already based educational material, and by addition of new educational courses.

Moreover, it is possible to base the educational system in Internet on several servers, this will allow to distribute the system load. For example, the core of educational system can be based on one of the servers, the educational materials of one subject can be based on another server, the educational materials of the other subject can be based on the third server and so on. At the same time, the educational materials, which were worked out in one educational institution, can be based on the server of this institution and included with the help of methodological navigator into the main index of NIMTS, after that they can be accessible to the users all over the world.

5. CONCLUSION

In the laboratory of mathematical of technical systems and information technologies BSUIR with the assistance of Bialystok Polytechnic (Bialystok, Poland) the interactive multimedia educational courses are worked out. They are based on the principles mentioned above.

At the present time the courses “Theory of oscillations” and “Pneumatic automation”, represented as a set of interactive multimedia cells, accomplished in Macromedia Flash environment, are being worked out [5...6]. All cells are based on real formulas, which allow not only studying the educational course, but conducting an interactive investigation. As a result it arouses interest of students to the course and promotes strengthening of information.

BIBLIOGRAPHY

- [1] Linnik I.I. Preparation of electronic aids for testing and test-suitable designing in the context of project REASON // Distance learning – educational environment of the XXI century: Materials of the III international guidance conference, 13-15 November 2003. – Mn.: BSUIR, 2003. – P.357-359.
- [2] Weiner L.G., Reshetnikova O.V. Electronic methodical complex for computer graphic for distance learning // Distance learning – educational environment of the XXI century: Materials of the III international guidance conference, 13-15 November 2003. – Mn.: BSUIR, 2003. – P.434-435.
- [3] Siemieniako F., Karpovich S., Dainiak I. Integrative learning system // Book of abstracts,

Bydgoszcz – Białystok – Holny Mejera,
September 20-23, 2003. – P.43.

- [4] Dainiak I., Karpovich S., Ahranovich A., Huscio T. Interactive multimedia pages for the subject "Technics of Automation" // Book of abstracts,

Bydgoszcz – Białystok – Holny Mejera,
September 20-23, 2003. – P.14.

- [5] Reinhardt R., Lenz D. Flash 5. User bible. – M.: Publishing house "Villiams", 2001. – 1164 p.
[6] Muck K. ActionScript. Detailed manual. – SPb.: Symbol-Plus, 2002. – 792 c.