THE ORGANIZATION OF THE DISTANCE EDUCATION ON THE BASE OF DOCUMENTS OF THE SYSTEM *Mathematica*

Yury PAZNIAK
Belarusian State University
Center of Information Technologies
poznjak@cit.bsu.unibel.by

Galina SHVARKOVA
Belarusian State University
Center of Information Technologies
GShvarkova@cit.bsu.unibel.by

Present work offers the analysis of features of the electronic textbook, the description of its structure, the definition of the main task of the electronic textbook. It's discussed the ways of organization of the electronic textbook by means of interactive interaction with it. On the basis of skills got by the pupils at school it's given the analysis of age abilities of the pupils to independent study of a new material. Is given the reasons and description of work that authors carry out in order to create the physics and mathematics electronic textbook for schoolboys on the basis of system Mathematica. We consider Mathematica as the most appropriated to the description of the given subjects. Here's paid attention that the elements of the electronic textbook are possible to use not only in the distance education, but also as auxiliary tool for the teacher in a complex with usual lesson.

Introduction

The electronic textbook is the most important part among the various components, which necessary to carry out the distance education. Because one is not only a source of knowledge, it forms at the student perception of a subject. Working on creation of the electronic textbook, we are constantly in a stage of thinking of question how it should be organized in order to satisfy overall objectives of the textbook - effective training.
It is not enough for the electronic textbook to represent the statically submitted information of the scanned book. It is necessary, that the electronic textbook provides study new not through study of the written theory. It should be an environment of process of knowledge where the schoolboy performs the tasks ordered by a special image, carrying out which, the he makes "opening" new. The electronic textbook should be as much as possible personalized, adaptive, auto updated, supposing a feedback with the teacher.

The Analyses of structure of the electronic textbook

Due to opportunities of electronic devices, with which help the work of the electronic textbook can be carried out, this product can and should combine in itself functions of many objects of interaction with the man: the usual books, teachers, communication means, subjects of entertainment etc. The analysis of already existing versions of the training electronic manuals and work on their creation have given us the following vision of structure of the electronic textbook:

1. Educational material,
2. Tasks for self-checking,
3. Games and entertaining blocks,
4. Sound filling,
5. Interactive elements.

Each of these structural elements contains set of components, so **the educational material** represents electronic hypertext [1], being a composition of

- The texts placed with use of opportunities of textual editing and allocation;
- Animated demonstrations of explaining figures, diagrams;
- The disassembled examples with the incorporated opportunity of modeling;
- Video blocs;
- The convenient and attractive interface.

The tasks for self-checking contain multilevel

- The tasks for the independent decision with the answers and decisions,
- The tests;
- Puzzles, crossword puzzles etc.

The games and entertaining parts are necessary not only to support interest to work with the electronic textbook, but also in parallel to carry out functions of fastening and control of a material, functions of alternation of a sort of activity and entertainment, therefore they should contain:

- Games which are not concerning directly an investigated material, but developing skills necessary for study of taught subjects;
- Games directly concerning an investigated material;
- Musical clips and prompt etc.;
- Video of a sketch, animated cartoons.

The sound support should contain

- Dialogue elements of dialogue with the user [2],
- Parallel soundtrack of the important places of an educational material: definitions, fixing of essential rules, conclusions;
- Uniting and connecting background environment.

The interactive components of the electronic textbook are a perspective direction in work on creation of the textbook. The main its function is the permanent updating and addition by a material, and as an opportunity for the user to cooperate with information sources and centers, which issue software.

The main difference of a material in an electronic kind from the book is the opportunity of representation of necessary explanations and illustrations as **interactive animations**. We consider the next functions of animation representation:

a) Formation of correct representation about concept or law according to the investigated scientific theory;
b) Activization development and stimulation of abstract thinking;
c) Multiplan submission and mastering of a material;
d) Personal participation of the schoolboy in modeling;
e) Development of research skills.

Opportunities of animation:

a) Recurrence of recurrence of reproduction of animation;
b) Change of speed of viewing, stop;
c) Color allocation, occurrence of inscriptions;
d) Participation in creation of images at the expense of opportunities of modeling.

The subjective preconditions for self-education

Essential item in creation of system of the distance education for the schoolboys is the question about age abilities of the pupils to study independently a new material and about densities of self-training at study.

The training of the pupils in the Belarussian school is constructed in such a manner that the study of a new material occurs, basically, under the direction of the teacher. The fastening and improvement of the investigated material is removed for independent study. According to the Programs of Ministry of Education of Belarus the requirement to skills of self-education during study at school it are represented as follows:

- After graduation of elementary school (10 years) the schoolboy should be able to cope independently with the tasks the teacher gave him. I.e. the circle of independently carried out works does not leave for the certain frames limited by adults.
- After graduation of base school (15 years) the independent activity of the schoolboy considerably extends. The schoolboy should be able to study independently a material, which volume is about one - two school paragraphs, and to operate with this volume (to make the message; to generalize, to analyze a material and to write the abstract or composition etc.)
- After graduation of high school (17 years) the self-educational skills should achieve a maximum level. The pupils should be able to master a material in volume of the unit (beginning from independent statement of tasks up to skill to analyze a level of the knowledge).

So, 15-17-years teenagers have prepared and advanced enough for the partial self-education. The work with the electronic textbook will help to estimate the own level of preparation to self-training, to develop skills of self-organizing. It'll help teenagers to form their professional interest.

One from the reason for organization of the distance education for the schoolboys is an existing demand:

a) there are the pupils compelled to study independently some subjects (for example, pupils transferred to individual training because of a condition of health; schoolboys, who are abroad our country, but wish to pass school examinations here; cases of temporary absence of the teacher etc.)
b) demand for the profile (profound) study of some subjects for self-education or for receipt to higher educational institution.

The organization of the distance education for the schoolboys is very important for all system of education. It'll stimulate the perfection, development and creation of uniform educational and information environment for man [3]. Thus, a purpose of our work is to organize the distance education according to analysis has made above.

The work for creation of the electronic textbooks at the Center of information technologies of Belarussian State University

On the basis of the Center of information technologies of Belarussian State University the we do the work with the purpose of creation of the physics and mathematics electronic textbooks for the schoolboys with use of the system *Mathematica* [4]. The favorable factors in this work are:

1. The specificity of subjects (mathematics and physics) consisting in convenience of representation them and submission with use of computer technologies, that is caused by the following

a) the essential part of the educational information is submitted as an abstract - illustrative material;

b) it is wide used the mathematical device for the description of the theory and modeling of the practical appendices.

2. The use of *Mathematica* optimum corresponds to the description of the given subjects. The most important advantage of the *Mathematica* is the permanent development of system and creation of such appendices, as *webMathematica*, which expands opportunities of use of the textbooks in distance education.

3. Specificity of subjects, which consists in

a) stability of the contents of the school Program on mathematics and physics;

b) the large densities of the control in educational process and presence of the large quantity of typical educational tasks, that allows to create testing and training software.

To create an adequate product and to offer it for use at once in the distance education without preliminary consumer approbation it is impossible. Besides, the main condition at such a work is the study, analysis and use of results of activity of the teachers.

The courses at the our Center for the schoolboys became an experimental platform for tests created electronic versions. This work represents the following:

- at first an educational material is created at electronic form,
- then, during the lessons the teacher observes how pupils percept a material, fixes the moments causing doubts, questions requiring the explanations, traces efficiency of offered animations.
- by results of the carried out supervision there is a completion of a material.

Thus, the elements of the electronic textbook, developed by us, on base *Mathematica*, are possible to use not only in the distance education itself, but also as auxiliary tool for the teacher in a complex with usual lessons. While we can definitely summarize, that our experience shows the technology of training raises; the time necessary for an explanation of a new material is essentially reduced; the pupils work with the large interest.

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