METHODICAL ASPECTS OF THE CONSTRUCTION OF FUNCTIONALLY ORIENTED ELECTRONIC MANUALS ON PHYSICS FOR ZZSO

Abstract. The article proves that electronic educational edition is designed to make it as easy as possible to understand and remember the most important concepts, laws and regularities with the involvement of all senses. At the same time, all the material is translated into a bright, exciting, multimedia form with extensive use of graphics, animation, including interactive, sound effects and video clips. Finally, we note that electronic textbooks (and other software initial tools) will not replace traditional printed textbooks and manuals in the near future. Paper and electronic editions belong to different means of learning, each of which has its own didactic capabilities. Even in foreign systems of distance education, where the technical level of equipment of the educational process is very high, the share of printed books still remains significant.

Keywords: electronic educational edition, senses, equipment of the educational process, electronic textbooks.

Formulation of the problem. At the current stage of the development of pedagogical science, the physics textbook is considered as a complete system that belongs to a more complex system of education. It is losing some of its characteristics of the past when it was a universal teaching tool. For the student, the textbook is a source, content and tool for assimilation of educational material, a means of its development and formation of key competencies. At the same time, the textbook is not the only carrier of educational information, therefore, in its content,
the student should find guidelines for further independent work in accordance with his cognitive capabilities and needs.

Thus, the textbook acts as an anticipatory tool for the organization of education. Its functions are expanding, acquiring new content, the role of some of them is being strengthened: motivational, integrating, systematizing, development of key competencies in the field of physical sciences, development of independent cognitive activity (self-education in the field of physical knowledge) outside the information space of the textbook. The last function acquires a dominant meaning, as it stimulates the student's orientation in the media-educational information space.

A modern textbook on physics should have clear signs of a certain pedagogical technology and thus give the teacher a model of a good technology of learning and development. A new object of researchers' attention is the electronic competitor of the regular school textbook, which has appeared recently - the so-called «electronic textbook». Unfortunately, in Ukraine there are still no state-approved requirements for electronic educational tools that would regulate their content and structure, as well as didactic conditions for their use in the educational process. Moreover, despite the fact that more than 100 software pedagogical tools have been developed and are being tested by order of the Ministry of Education and Culture of the Ministry of Education and Culture of Ukraine, there is still no general concept of their use in education.

We have to admit that the huge funds invested in providing schools with computer equipment do not have the desired effect. In fact, the computer classes of the «first wave» are already morally obsolete, and their use in teaching other subjects, except computer science, practically never started. The main reason, in our opinion, lies in the lack of digital textbooks adequate for the subjects being studied.

So, today there is a problem of defining the scientific and methodological requirements for the design and creation of electronic textbooks, determining their role and place in the educational process, taking into account both advantages and disadvantages.

**Analysis of literature.** The concept of an e-textbook is to some extent in the formative stage. Issues related to the creation and use of electronic teaching aids, in particular electronic textbooks, were studied by such scientists as: V. Ageev, V. Bykov, A. Verlan, A. Gurzhii, M. Zhaldak, Yu. Zhuk, V. Lapinskyi, Yu. Mashbyts, A. Pidlasiy, S. Rakov, Yu. Ramskyi, O. Tyshchenko, A. Uvarov, M. Shishkina, M. Shut, and others.

In the scientific and methodical literature of domestic and foreign authors, the aspects of the implementation of electronic resources are considered quite fully: technologies and programming tools, computer graphics and design, three-dimensional modeling, hypertext, multimedia (editing of soundtracks, video editing, creating animations, etc. However, didactic and methodical issues of designing and creating electronic textbooks are not considered comprehensively. Moreover,
different authors offer various attempts to define this concept and outline the limits of its application. A common feature of the definitions of a computer textbook is that it means two parts - educational material contained on electronic media in the form of drawings, tables, animation and video fragments, other types of graphic images and methodical materials for them on printed media [7].

One of the possible variants of the definition is the following: «A computer textbook is a collection of software and hardware tools and educational and methodological publications, united by a common idea and subject and aims to intensify the educational process based on the use of a personal computer in educational work » [5, p. 98].

There is some uncertainty in the definition of the term «electronic textbook». When defining it, such terms as pedagogical software, hardware and software, computer program, and others are used. It is possible to note that some authors also single out such terms as: «educational material on machine media» and «automated training course» etc., which are very close to the concept of «electronic textbook» [3].

For example, S. Myslovska proposes to call an electronic textbook a software tool for educational purposes, which covers significant sections of educational disciplines or entire academic disciplines, developed in accordance with the current program of the relevant educational subject and should perform the functions of a textbook [5].

The difficulty in formulating this term can be explained in part by the fact that there are a significant number of different types of textbooks, which are often not very consistent with each other and are difficult to come under a common definition. Analyzing various options for the definition of an electronic textbook, we came to the following formulation: an electronic textbook is a basic educational electronic publication that contains systematized material from the relevant field of knowledge, provides creative and active acquisition of knowledge, skills and abilities by students in this area and was created at a high scientific and methodological level, fully in accordance with the state program.

An electronic textbook, as well as a traditional «paper» one, includes, first of all, educational material containing basic data about the subject being studied. At the same time, the electronic textbook has a number of distinctive features that determine its advantages compared to a traditional book, namely:

– the possibility of modeling and simulating the processes and phenomena being studied;

– demonstration of visual educational information: the use of color images serves for a visual presentation of the material, facilitates its understanding and memorization, computer animation allows to increase the speed of information transfer to the student and increase the level of its understanding; the audio accompaniment is an additional method of information transmission, allows you to better perceive the material being studied, to enrich it with the teacher's comments.
– more fully provides a visual demonstration of the studied material, improves its perception;
– there is a possibility of quick transitions between blocks of the studied material;
– availability of various services [7, p.6].

Presentation of the main research material. To date, there is not only a unified approach to the classification of electronic means of educational purposes, but also certainty with terminology in this area. Some authors consider electronic textbooks as a complex of printed and electronic books that complement each other. The electronic book is still considered as an automated version of the printed edition with the preservation of the structure and due to the use of information technologies, it allows to expand its possibilities. Here are some formulations of the concept of an electronic textbook – it is a computer pedagogical software tool that is primarily intended for the presentation of new material that complements printed publications, serves for individual and individualized training and allows to a certain extent to test the acquired knowledge and skills of the student - it is a pedagogical software tools that cover significant sections of training courses or complete training courses. The hypertext structure of the educational material, the presence of control systems with elements of artificial intelligence, self-control unit, advanced multimedia components is characteristic of this type of PPZ. So, we have two directly opposite views on the concept of an electronic textbook, which is a separate element of an electronic educational and methodological complex, which also includes handbooks, glossaries, laboratory workshops, test funds, computer simulators.

In this case, the electronic textbook supports only the function of presenting new material, all other functions of the textbook rely on other modules of the educational and methodological complex, the electronic textbook itself is a program and methodological complex that provides both the presentation of new theoretical material and a package of educational controlling and other programs and methodological instructions for work with an electronic textbook and for the organization of practical classes and training educational activities. Such an interpretation should take into account the functions that rely on the electronic textbook and the specified functions of the software-methodical complexes that are not inherent in the electronic textbooks. The main criterion for giving a certain didactic tool the status of a textbook is not the carrier of information, but compliance with the basic pedagogical requirements for content and educational and methodological apparatus in its construction.

The main drawback of the existing manuals on paper is the traditional use of a linear order of the presentation of the educational material, the absence of a problem presentation, the impossibility of organizing feedback, the process of monitoring the level of knowledge, skills and abilities. The electronic textbook makes it possible to avoid these shortcomings, while the electronic textbook can be
considered as an additional educational and methodical tool that allows methodically and correctly to organize the independent work of students to develop their skills and abilities. We will formulate the main features of its structural organization, the use of multimedia capabilities, interactivity and multimedia, quick feedback and the search for necessary information, the possibility of organized access from the pages of the electronic textbook to the necessary information resources of the Internet, the presence of illustrative examples and models, accompanying the text material with audio and video information, the organization of multi-level monitoring of students' educational achievements multi-level presentation of educational material textbook material must be available for copying and printing electronic textbook must be open for development and improvement by its authors availability of a system of protection against unauthorized changes to the textbook.

Electronic textbooks allow you to read them in low light or even in the dark, listen to the text of the book, which makes the electronic textbook an audio book, and also change the font size, search for key terms and definitions, make bookmarks and annotations, technically enable the translation of books into different languages, create prerequisites for overcoming physical sensory and cognitive barriers. ers on the way to the education of students with various forms of disability from a methodological point of view, EP is an effective educational resource for the independent work of distance learning students in practical and laboratory classes, analysis of information and its graphic interpretation. Let's consider the disadvantages of electronic textbooks. Most software tools provide for the presentation of material in the form of text that duplicates printed teaching aids, however, the perception of text from the screen is less convenient and effective than reading a book. Forms of control that are implemented using ICT reduce the time of live communication, this can lead to the impoverishment of the vocabulary, the curtailment of social contacts, the reduction of the practice of social interaction and communication, individualism.

Learning process, ensure the student's work in self-monitoring mode, monitor knowledge with error diagnosis and feedback, and conduct experiments in virtual reality. An electronic textbook (even the best one) cannot and should not replace a book. Just as the screen adaptation of a literary work belongs to another genre, so the electronic textbook belongs to a completely new genre of educational works. And just as watching a movie does not replace reading the book it was based on, the presence of an electronic textbook should not only not replace reading and studying a regular textbook, but on the contrary, encourage the student to take up the book. That is why, to create an electronic textbook, it is not enough to take a good textbook, provide it with navigation (create hypertexts) and rich illustrative material (including multimedia tools) and play it on a computer screen. An e-textbook should not turn into either a text with pictures or a reference book, since its function is fundamentally different.
An electronic textbook should make it as easy as possible to understand and remember (actively, not passively) the most essential concepts, statements and examples, involving in the learning process other capabilities of the human brain than a regular textbook, in particular, auditory and emotional memory, and also using computer explanations. The textual component should be limited, because the usual textbook, paper and pen remain for in-depth study of the material already learned on the computer. Education reform requires the creation of such electronic editions, the presence of which will provide the same computer environment for students and teachers, in the classroom and at home. Here it is appropriate to draw a parallel with the reform of European education connected with the invention of printing.

Medieval schoolchildren were completely dependent on their teacher, because only he possessed information. Gutenberg's invention of printing made the source of information (the book) equally accessible to everyone, which fundamentally changed the education system. A book, a pen and paper - both the teacher and the student began to own all this, both in the classroom and at home. Similarly, for a successful reform of modern education, it is necessary to make new sources of information (in particular, electronic textbooks) equally accessible to all. However, in this case, it is the teachers who often find themselves in a worse position, since they are less accustomed to working with a computer for a number of reasons of an objective and subjective nature and are less ready to accept new technologies in education. It is obvious that with the appearance and improvement of various electronic editions, educational programs must fundamentally change, as well as the role of the teacher in the educational process. However, even the best electronic learning tools will settle as a dead load on computers if their use is not methodically ensured, if a computer-based educational information space, unified for teachers and students, is not created.

Successful computerization of education depends not on the number of computers, but on the quality of teaching aids and methodological support for their use. In our opinion, the lack of a full set of methodical materials, as well as convenient and effective forms of professional development, prompt and complete information about the appearance and content of new computer training packages, force the teacher not to use the achievements of computerization in his professional activity.

The analysis of available pedagogical software tools for secondary schools and foreign developments allows us to determine some features of the selection of educational tasks for the acquisition of skills and abilities, the implementation of self-control, as well as typical shortcomings of such tools and possible ways to avoid them, namely: clear planning and control over during the work of schoolchildren of different ages at the computer (in addition to the individual work of the student with the electronic textbook, work with the printed textbook, the completion of tasks in
the workbook, as well as the work with the electronic textbook frontally under the guidance of the teacher using a multimedia projector and an interactive whiteboard should be provided); the electronic textbook should not duplicate the text material from the printed textbook, but should present it in the form of interactive reference diagrams supplemented with visual multimedia materials, theses, etc. Forms of control, which are implemented using ICT, reduce the time of live communication, this can lead to the impoverishment of the vocabulary and the development of «complexes» when communicating with peers and adults.

Therefore, when organizing work with an electronic textbook in class, it is important to use a variety of interactive teaching methods that will allow students to communicate with each other, when preparing educational material for an electronic textbook, the process of knowledge transformation is implemented indirectly through the text according to the scheme «author's knowledge» - text – «knowledge, reader» and, unfortunately, allows irreversible losses at all its stages. So, already at the first stage, which takes place without a reader, the text created by the author does not contain the knowledge of the author, but only certain information about them. In the case of traditional classes, the teacher has additional resources that allow to reduce these losses. Correctly placed accents, the advantages of verbal communication make it possible to pay attention to the most important issues in the section being studied. In order to reduce these losses, the electronic textbook can use the techniques of adding animated accents on the objects that need to be paid attention to, as well as sound accompaniment with an explanation of the process under consideration [1-2, 4].

Conclusions. Therefore, one of the decisive factors in the modernization of the education system is the creation of a new generation of teaching aids that would combine the achievements of modern pedagogical science with the powerful didactic potential of information technologies. An electronic textbook is a complex software system that makes it possible to present educational material using a rich arsenal of different forms of information presentation and ensures the continuity and completeness of the didactic cycle: it provides theoretical knowledge, ensures control of their level, as well as information and search activity. The electronic educational edition is designed to make it as easy as possible to understand and remember the most important concepts, laws and regularities with the involvement of all senses. At the same time, all the material is translated into a bright, exciting, multimedia form with extensive use of graphics, animation, including interactive, sound effects and video clips. Finally, we note that electronic textbooks (and other software initial tools) will not replace traditional printed textbooks and manuals in the near future. Paper and electronic editions belong to different means of learning, each of which has its own didactic capabilities. Even in foreign systems of distance education, where the technical level of equipment of the educational process is very high, the share of printed books still remains significant. The obtained results made
it possible to outline some directions for further research: adaptation of the electronic textbook for the organization of specialized training, training of children with physical disabilities; development of a methodical electronic manual for teachers, which supports control and evaluation functions and provides the teacher with the opportunity to design his own components of the electronic textbook.

References: