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ANALYSIS OF METHODS AND ALGORITHMS OF CREATION OF MULTIMEDIA ELECTRONIC TEXTBOOKS

ISOKOVA ADIBA SHAMSHIDIN KIZI

student of TATU named after Muhammad al-Khorazmi, Tashkent, Uzbekistan
Tel: (0890) 225-5960, E-mail: isoqova0101@gmail.com

Abstract. This article talks about the sequence of steps of creating interactive multimedia electronic textbooks, in other words, algorithms, which are important for organizing the educational process and independent learning. The scientific works of a number of scientific researchers, textbooks and materials are analyzed, the specific characteristics of electronic educational resources, their requirements, as well as the structure and creation of new generation textbooks in the modern world, that is, interactive electronic textbooks. the opinions and opinions of many scientists regarding the identification of the main algorithms were discussed. This scientific article is enriched with scientific-theoretical knowledge about the creation of educational textbooks that allow students to learn textbooks independently through today's modern interactive electronic textbook creation algorithms.

Keywords: Algorithm, multimedia electronic textbooks, steps of creation, educational process, interactive, information technologies.

Introduction. In the era of rapid development of information technologies, the creation and use of interactive electronic textbooks developed on the basis of multimedia technologies in the educational system not only significantly increases the effectiveness of the educational process and the quality of education, but also expands the audience of independent and distance learning, as well as activating the educational process, organizing it more rationally and effectively, will lead to the rapid and wide spread of competence on a global scale. Of course, the idea of meaningful organization of the educational process based on the creation of multimedia electronic textbooks based on modern information communication technologies is not new. Pedagogical and psychological aspects of creating such effective electronic textbooks have been presented in the scientific works of many scientists and researchers until now, and are reflected in the scientific research of a number of researchers such as Russian scientists A.I. Bashmakov, A.A. Andreev, V.I. Batishchev, I.V. Robert .

At the moment, the need for "new generation textbooks", i.e. multimedia electronic textbooks, corresponding to the world trends in the development of the educational process, is increasing significantly. New-generation textbooks not only contain certain educational knowledge, but also allow pupils and students to better understand and remember the textbook independently without a teacher, to organize an independent preparation process, and also to repeat the material in an unlimited amount. It should help to repeat, to strengthen the acquired knowledge on the basis of control materials, as well as to analyze the mistakes made in them, in general, it should help to organize training and control.

The results of the research conducted by researchers show that the design and creation of modern electronic textbooks with interactive features is a necessary condition for improving the quality of education. It is appropriate if it is used not only as a visual

tool in teaching, but also as a constantly necessary tool for understanding the laws and processes that are more difficult to imagine. It can also be noted that electronic textbooks should not exactly repeat printed textbooks. The reason is that the multimedia e-textbook is unique in that it can rely on several features at the same time: audio, video, picture, graphic, drawing, as well as diagrams and illustrations.

When the analysis of most electronic educational tools is considered, the issues of correct presentation of the given materials in them have not yet been developed. Creating an effective and easy-to-use modern electronic textbook is a long and complex process, and theoretically speaking, it is simultaneously related to the field of science in which the textbook is being created, as well as information communication. It requires the necessary knowledge in the field of technologies, and in practical terms, the cooperation of qualified specialists in various fields. Before starting to create electronic textbooks created using multimedia capabilities, it is necessary to develop certain tasks and stages of creation, i.e., algorithms for its development. The developed algorithm should be capacious and flexible, suitable for all educational textbooks and specialties.

It is necessary to give some of the many interpretations of the concepts of "algorithm" presented in the scientific literature before moving on to the definition of the concept of algorithms for the development of multimedia electronic textbooks.

The word "algorithm" comes from the name of the great scientist Al-Khorazmi, and its modern official definitions were given in the 30-50s of the 20th century by Turing, Post, Church (Church-Turing thesis), N. Viner, A. A. Markov given in his works. Encyclopedia Britannica defines it as follows: "An algorithm is a systematic procedure that produces a solution to a problem in a finite number of steps [1]". Algorithms are a fundamental tool for solving problems both in the digital world and in many real-life scenarios [2].

Summarizing the above definitions, it can be concluded that the algorithm for creating multimedia e-textbooks is, in simple language, "a sequence of commands consisting of finite steps to solve the problem of creating an effective e-textbook."

Literature review. The issue of creating and using modern electronic textbooks with multimedia and interactivity is a matter of special attention. Technology of creating electronic educational resources A. I. Bashmakov, I. A. Bashmakov, P. Monastirev, E. Alenicheva, A. M. Moiseev, N. M. Sladkova, Avramenko G.V, A. Gritchenko, Kapustin Yu.I., Shcherbakov V.V,G. B. Kornetov, V. A. Chenobytov, A. A. Andreev, E. S. Zair-Bek, L. Zainutdinova, O. A. I. Kirillova, I. V. Robert, A. Yu. It is cited in the scientific works of Uvarov and others. The analysis of these works allows to determine in more detail the main stages of creating electronic educational resources, i.e. algorithms.

Having analyzed several literatures on the technology and stages of creating a multimedia electronic textbook, we would like to draw your attention to the following comparative table. The works of several research scientists in this regard are cited one by one.

Table 1. Stages (algorithms) of multimedia electronic textbook development.

Researchers	Stages (algorithms) of multimedia electronic textbook development
P. Monastirev, E. Alenicheva [3]	1. Strategic stage 2. Tactical stage 3. Theoretical design stage 4. Plan implementation stage 5. Technological and design stage 6. Implementation stage 7. Control-diagnostic stage 8. Prognostic stage
Avramenko G.V. Kapustin Yu.I, Shcherbakov VV [4]	1. Development of multimedia electronic textbook script; 2. Preparation of electronic textbook text, illustrations, audio and video fragments; 3. Combining various elements into a single structure of an electronic textbook.
Bashmakov A.I. Bashmakov I.A [5]	1. Conceptual design; 2. Design; 3. Implementation; 4. Product preparation for distribution
Gurevich R.S, Kademiya M.Yu [6]	1. Building a model of the content of the educational material; 2. Development of the script for the manual; 3. Building scenarios and algorithms for educational packages
I.M.Kuzbit [7]	1. Determining the list of literature on the topic of the work, analyzing the sources and summarizing the material; 2. Development of the structure of the manual; 3. Acquisition of necessary knowledge and skills to create an electronic textbook; 4. Design development, creation of basic control elements, menus, creation of screensavers, creation of layouts, connection of the program with the necessary applications; 5. Analysis and evaluation of the quality and effectiveness of the prepared electronic textbook.
Zaynutdinova L.X [8]	1. Forming a creative team; 2. Determining the purpose and content of the training; 3. Development of a psychological and pedagogical script of the resource; 4. Software implementation of the resource; 5. Test, debug and validate the developed resource.
A.G.Gritchenko [9]	1. Determination of goals and tasks to be achieved with the help of an electronic textbook; 2. Development of structural and algorithmic structural schemes for sorting electronic textbook information material; 3. Development of content of electronic textbook blocks on modules and topics; 4. Visualization of electronic textbook structures; 5. Search for software to create an electronic textbook and implement an electronic textbook development project; 6. Development of methodological recommendations for the user of the electronic textbook; 7. Testing the electronic textbook during the educational process; 8. Correction of the content of the electronic textbook and identified deficiencies
Andreev A.A [10]	1. Concept development; 2. Design;

	3. Designing screen forms and information blocks; 4. Development of content on sections and topics; 5. Filling out the structural elements of the application; 6. Testing and debugging; 7. Introduction to the educational process
Lobachev S.L [11]	1. Preparatory stage ⇒ Structure of the material ⇒ Preparing the text ⇒ Preparation of multimedia fragments 2. Placement stage ⇒ Collect sections ⇒ Preparation of control part ⇒ Interface formation
Sh.A.Norqulov [12]	1. Acquaintance of teachers with existing electronic textbooks in this field, familiarizing them with requirements. 2. Forming a working (creative) group to create an electronic textbook; 3. Structuring the training course (lecture texts, materials); At this stage, the educational material is divided into modules. 4. Creation, review and expertise of the electronic textbook based on the plan and script; 5. Approval of the electronic textbook in the Scientific Council and its distribution as a program.
D.S.Tuxtasinova, V.S.Hamidov [13]	1. Selection of sources related to science; 2. Conclusion of agreements on the right to use and process resources; 3. Developing a list of contents and concepts; 4. Creating a text processing and support section in sections (modules); 5. Implementation of hypertext in electronic form; 6. Development of computer support; 7. Selection of materials to bring to multimedia objects; 8. Development and implementation of implementation with sound accompaniment; 9. Preparation of material for visualization; 10. Preparing to use the electronic textbook; 11. Development of teaching methodology

Methodology & empirical analysis. Based on the above-mentioned table, we defined the first step of the algorithm for creating multimedia electronic textbooks as defined by A.G. Gritchenko, which is to determine the goals and tasks to be achieved with the help of the electronic textbook. After all, goals and tasks based on them lead us to results.

The second step is to form a working (creative) group to create an electronic textbook. Of course, this step is important in creating an effective multimedia e-textbook.

The development of the general concept of the textbook is the third step of our algorithm, which includes the formation of a "paper" sketch of the product being created.

Thus, our next step continues with the creation of the cover of the textbook presented in the scientific work of A.I. Bashmakov, I.A. Bashmakov. Electronic textbook The appearance of the cover is always very important, because it is the first thing that

attracts the reader to the book. This is because the cover image is the first impression of an e-textbook.

The step of developing a general plan for creating a multimedia electronic textbook consists of developing the scenario of the textbook, that is, developing its structure, developing structural and algorithmic schemes for sorting information material.

Our sixth step is to choose software tools for developing e-learning resources. In this, the capabilities of programs used to create a multimedia circuit are analyzed. Of course, it takes into account the criteria for choosing software tools - the purpose and characteristics of the textbook being created, the methods of organizing educational activities using it in the future, the complexity of interactivity, the price, and several other requirements.

In accordance with the developed structure, the preparation of educational materials of the electronic textbook, i.e., the text of the electronic textbook, as well as the preparation of multimedia fragments (illustrations, audio and video), as well as the development of control questions and tests, will be continued.

The stage of direct implementation of the concept in the form of a software product, which Russian scientists P. Monastirev, E. Alenicheva mentioned in the stages of creating an electronic textbook, determines our next step. In this step, the creation of the interface of the electronic textbook, the development of the design, the creation of the main control elements, the menus, the integration of various elements into a single structure (all the selected and developed parts of the electronic educational resources are assembled into a single whole to present to the students according to the script developed by the author)), developing a knowledge management system (identifying the types, goals, methods and forms of self-control and mutual control, developing an evaluation system, creating practical tasks, interactive tasks and test-type tasks for students), as well as , connecting the program with the necessary applications is carried out.

At the stage of testing the finished software product, of course, the created multimedia electronic textbook is tested, the shortcomings are identified during the testing process: malfunctions, defects, malfunctions, errors, undesirable situations, etc. [14]. According to the test results, the deficiencies are corrected. This step of the algorithm requires careful checking of text parts for syntactic and stylistic errors, editing of charts, diagrams, drawings and animations.

Analysis and evaluation of the quality and effectiveness of the electronic textbook prepared in the next steps, analysis of feedback. Working on the received reviews and suggestions, improving the electronic textbook taking into account the opinions and wishes of users.

In our eleventh step, D.S. Tokhtasinova and V.S. Khamidov create and formalize electronic educational literature [13; 11-b], the stage of examination of the electronic textbook is carried out. The electronic textbook undergoes a special examination based on the requirements for electronic textbooks and is assigned a category.

The step of formalizing the developed multimedia electronic textbook as a commercial intellectual product and introducing it into the educational process determines the final step of our algorithm developed as a result of literature analysis.

Results. If we describe our algorithm in the form of a block diagram, we will have a clearer picture of how the sequence of steps occurs.

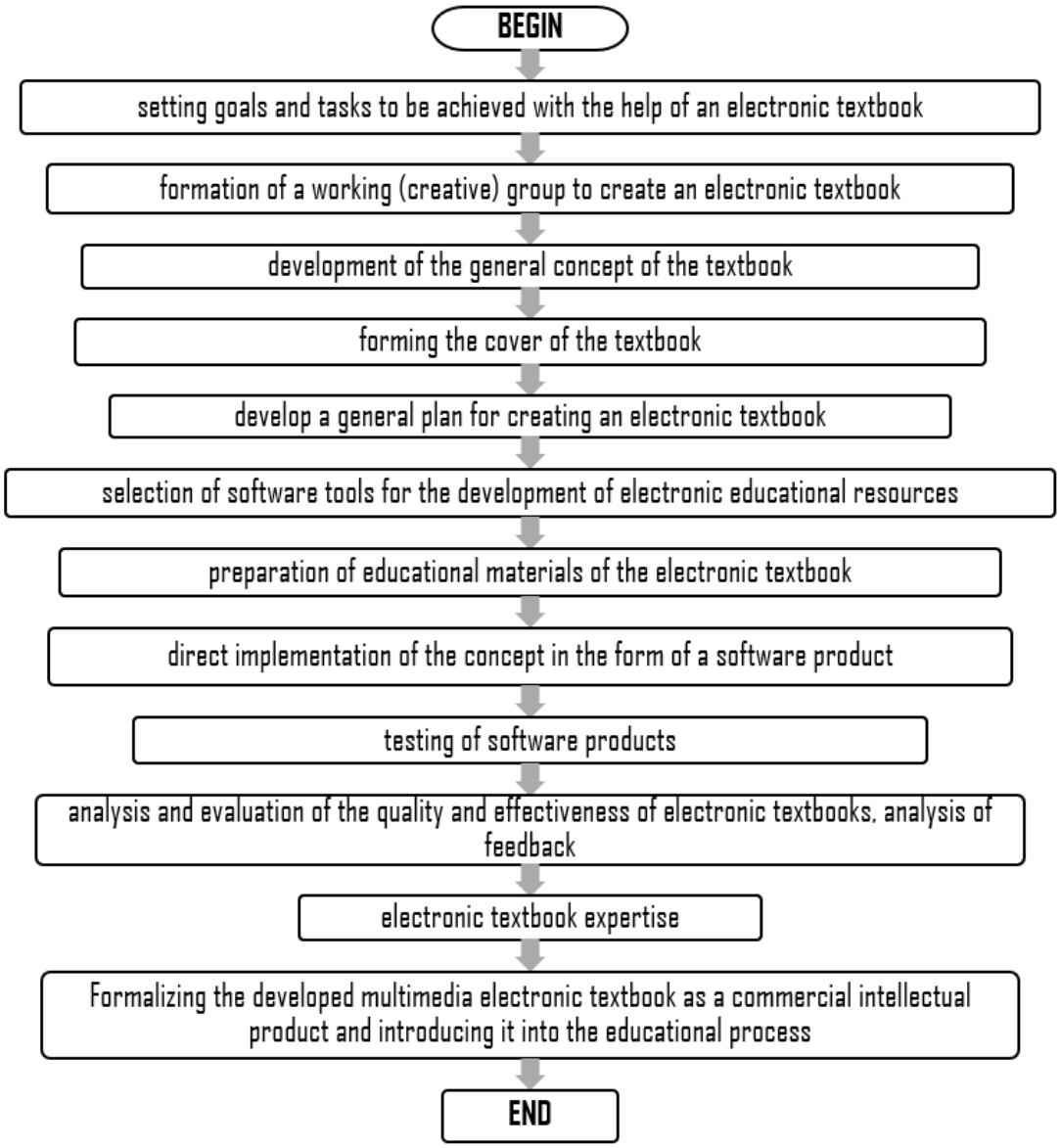

Figure 1. Flowchart of the algorithm for creating a multimedia electronic textbook.

Conclusions. In conclusion, it can be noted that there is no universal algorithm for creating an electronic textbook. However, the differences in the stages of e-textbook development are related to the authors' available capabilities (material and technical), and the differences in technology are not so great (for example, the number of e-textbook production stages varies from 4 to 10 among different authors). It also develops and improves in step with the improvement of information technologies. Of course, each

team or individual author uses his own technology. We also developed an algorithm for creating a multimedia electronic textbook, based on our experience gained as a result of a systematic analysis of domestic and foreign sources, as well as a comparative analysis of various methods of creating an electronic textbook proposed by practitioners who have implemented several original works.

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CONTENTS

PRIMARY PROCESSING OF COTTON, TEXTILE AND LIGHT INDUSTRY