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ELECTRONIC TEXTBOOK ON MATHEMATICS AS AN INNOVATIVE PRODUCT IN THE CONDITIONS OF REMOTE TRAINING

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Abstract. The distance learning format has updated the priorities of the electronic presentation of educational material in mathematics. This paper examines the main criteria for the creation and content of an electronic textbook as an innovative product. The characteristics of a new generation textbook, technological, the main volume of which is made up of innovative teaching technologies with computer support, is given. Such an approach will undoubtedly contribute to an increase in the level of technological culture in the system of higher mathematical education, which is characteristic of the requirement for the educational process of highly developed countries. The main indicator of the high quality of the training program is the effectiveness of the training. An electronic textbook on mathematics has artistic design, completeness of information, quality of methodological tools, quality of technical performance, clarity, consistency and consistency of presentation. An electronic textbook is not just a textbook, but a self-instruction manual that can replace a subject teacher.

Key words: electronic textbook, pedagogical innovations, electronic content, distance learning, innovative product, educational material.

At the present stage, pedagogical innovations take priority positions within the system of higher education. On the other hand, the conditions of the pandemic have significantly updated electronic content. Innovative technologies in teaching mathematics involve two types of linear interaction: student - computer and teacher - computer. In the first case, the computer assesses the correctness of the completed task and provides the necessary assistance: training takes place without the participation of a teacher. In the second case, the computer helps the teacher to manage the educational process, gives recommendations on the appropriateness of applying specific teaching influences to certain students. The capabilities of electronic resources allow you to explain new material, consolidate, repeat and control the educational process. Conducting lessons using computer presentations helps to focus students' attention on the significant points of the information presented;

electronic programs contain tasks of different levels of complexity, as well as tips, reference materials and algorithms; in the control of knowledge, test tasks have proven themselves perfectly. The relevance of the use of new information technologies is dictated, first of all, by the pedagogical needs to increase the effectiveness of developmental education, in particular, the formation of skills for independent learning activities, critical thinking, research, creative approach to learning [1, P. 84].

Innovative technologies for teaching mathematics also allow us to create various demonstrations and teaching technologies, games, and models. Such effective developments form a positive attitude of students towards learning, imply an unobtrusive way of providing assistance and the ability to choose an individual pace of learning, and contribute to the successful preparation for the final certification.

Within the framework of this article, I would like to consider the use of an electronic textbook in mathematics as an innovative product in a distant format in the educational process. Today there is no longer any doubt that the 21st century is the age of information and scientific knowledge. The modern understanding of quality education includes fluency in information technology as a necessary element. The use of information technology helps to improve the level of teaching, provides control, visibility, contains a large amount of information and it is an incentive in learning [2, P. 113].

In this regard, innovative technologies in education are such an organization of the educational process, which is built on qualitatively different principles, means, methods and technologies that allow achieving educational effects that can be characterized by assimilation of the maximum amount of knowledge; maximum creative activity and a wide range of practical skills and abilities.

The use of information technology in the educational process leads to the development of new pedagogical methods and techniques; changing the style of teachers' work, the tasks they solve; structure changes in the pedagogical system.

According to experts' opinion, new computer training technologies can increase the effectiveness of classes by 30% [3].

The modern education system provides the teacher with the opportunity to choose among a variety of innovative methods suitable for them "their" method, to take a fresh look at their own work experience. Today, in order to successfully conduct a modern lesson, it is necessary to comprehend in a new way your own position, to understand why and for what changes are necessary, and, above all, to change yourself. In our practice, we use the following modern educational technologies or their elements:

- personality-oriented teaching technology helps in creating a creative atmosphere in the classroom, as well as creates the necessary conditions for the development of individual students' abilities;

- the technology of level differentiation contributes to a more solid and deep assimilation of knowledge, the development of individual abilities, the development of independent creative thinking;

- multilevel assignments facilitate the organization of classes in the classroom, create conditions for the advancement of students in their studies in accordance with their capabilities;

- an activity-based and problem-search method of teaching contributes to the active cognitive activity of students, allows students to focus on finding and solving complex issues that require updating knowledge;

- research methods in teaching enable students to independently replenish their knowledge, delve deeply into the problem under study and suggest ways to solve it, which is important in the formation of a worldview;

- game technologies make the learning process more interesting, create a good mood for students, and facilitate overcoming learning difficulties.

Systematic work on the use of modern innovative technologies and their elements in the educational process contributes to improving the quality of knowledge on the subject. All of the above methods, when applied appropriately, stimulate and activate students' activities.

Thus, the most effective method currently is the combination of traditional forms of education and innovative technologies in the process of teaching mathematics [4,19]. They complement each other perfectly, allowing you to maximize the students' abilities for independent study and significantly increase the efficiency of the teacher.

Within the framework of this article, the criteria that should be followed when creating an electronic textbook on mathematics in the context of a distance learning process and the requirements for its content are considered.

The analysis of the literature presented on this issue indicates a relatively poor study of the problem, however, provides quite well about the algorithm for creating, such educational and methodological materials can be found in the works of B.S.Gershunsky, A.P. Ershov, T.V. Kapustina, G.A. Klekovkina, Yu.A. Mitenev, A.A. Kuznetsov, V. B. Labutin and others, and also valuable was the work of the team of authors A.B. Iskakova, K.A. Nurumzhanova, G.E. Senkina, A.K. Kozybay, G.S. Dzharasova and A.K. Kairbayeva on the factors and trends in the development of innovative processes in universities [5, P. 200].

1. The principle of quantization: the division of the material into sections, consisting of modules, minimal in volume, but closed in content.

2. The principle of completeness: each module must have the following components:

• theoretical core;

• control questions on theory;

• examples;

• practical tasks for independent solution;

• control questions throughout the module with answers;

• testing.

3. The principle of clarity: each module should consist of a collection of frames with a minimum of text and visualization that makes it easier to understand and memorize new concepts, statements and methods.

4. The principle of branching: each module should be linked by hypertext links to other modules so that the user has the choice of jumping to any other module.

5. The principle of regulation: the student independently manages the change of personnel, has the ability to bring up any number of examples on the screen, solve the required number of problems, the level of complexity set by himself or determined by the teacher, and also test himself by answering control questions and performing testing on the given level of complexity.

6. The principle of adaptability: an electronic textbook should allow adaptation to the needs of a specific user in the learning process, allow to vary the depth and complexity of the material being studied and its applied focus depending on the student's future specialty, generate additional illustrative material according to the user's needs, provide graphic and geometric interpretations concepts studied and student solutions to problems.

7. Principle of computer support: at any time of work, a student can receive IT support.

8. The principle of collection: an electronic textbook (and other educational packages) should be made in formats that allow them to be assembled into single electronic complexes, expand and amend them with new sections and topics, as well as form electronic libraries in individual disciplines (for example, for department computer classes) or personal electronic libraries of the student (in accordance with the specialty and the course in which he studies), teacher or researcher [6, P. 15].

The structure of the electronic textbook should be presented:

- information block with short educational material;

- a block of practical tasks functioning in the student-computer dialogue mode;

- test tasks aimed at monitoring the knowledge of students.

The information block should be supported by illustrative material (slides, diagrams, tables, support or mental maps), it is advisable to present dynamic processes and phenomena with video materials, there are also audio files to activate the auditory perception of information by students.

An electronic textbook often complements the usual one, and is especially effective when it: provides almost instant feedback; helps to quickly find the necessary information (including contextual search), which is difficult to find in a regular textbook; significantly saves time with

multiple calls to hypertext explanations; along with a short text - shows, tells, simulates, etc. (this is where the possibilities and advantages of multimedia technologies are manifested) allows you to quickly, but at the pace most suitable for a specific individual, check knowledge of a specific section.

The disadvantages of an electronic textbook include not very good physiology of the display as a means of data perception (the perception of text information from the screen is much less convenient and effective than reading a book) and a higher cost compared to a book.

According to the researcher L.A.Semiokhina, according to UNESCO, only 12% of the information is assimilated during audio perception, about 25% during visual perception, and up to 65% of perceived information during audio-visual perception [3].

In the conditions of the forced transition to the format of distance learning, accompanying scientific research is needed on the criteria for mastering knowledge within the framework of the linear parameter teacher - computer - student. It should be noted that we share the opinion of Professor E.O. Alaukhanov, who believes that distance learning “must find its niche” in the higher education system [4, P. 20].

Thus, the use of an electronic textbook in mathematics lessons allows you to: make the learning process more interesting, vivid, exciting due to the richness of multimedia opportunities; effectively solve the problem of visualization of training; to expand the possibilities of visualization of educational material, making it more understandable and accessible for students.

I would like to note that students show great interest in the topic when presentations are used to explain new material. Even passive students with a great desire to join the work. We use an electronic textbook at different stages of the lesson: verbal counting, when explaining new material; at consolidation, repetition, at the stage of knowledge control. So with the help of the programming language for the discipline "Mathematics", control programs have been developed to test the knowledge of students of formulas for differentiating functions, formulas for areas and volumes of geometric shapes, and others.

The value of using presentations, teaching and monitoring computer programs is obvious: saving time in the classroom, demonstrating neat and high-quality drawings, diagrams, clear samples of problem solving.

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ҚАШЫҚТАН ОҚЫТУ ЖАҒДАЙЫНДАҒЫ ИННОВАЦИЯЛЫҚ ӨНІМ РЕТІНДЕГІ МАТЕМАТИКАҒА АРНАЛҒАН ЭЛЕКТРОНДЫ ОҚУЛЫҚ

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Аңдатпа. Қашықтықтан оқыту форматы математика бойынша оқу материалын электронды түрде көрсетудің өзектілігін анықтады. Бұл жұмыста инновациялық өнім ретінде электрондық оқулық құрудың басты критерийлер мен мазмұны қарастырылған. Негізгі көлемі компьютерлік қолдауымен оқытудың инновациялық технологияларынан құралған технологиялық жаңа буын оқулығының сипаттамалары келтірілген. Мұндай тәсіл жоғары математикалық білім беру жүйесіндегі технологиялық мәдениет деңгейінің жоғарылауына ықпал етеді, бұл жоғары дамыған мемлекеттердің оқу үдерісіне қойылатын талаптарға тән. Оқу бағдарламасының жоғары сапасының негізгі көрсеткіші - оқытудың тиімділігі. Оқу үрдісінде заманауи инновациялық технологиялар мен олардың элементтерін қолдану бойынша жүйелі жұмыс пән бойынша білім сапасын арттыруға ықпал етеді. Математикадан электронды оқулық көркем деңгейіне, ақпараттың толықтығына, әдістемелік құралдардың сапасына, техникалық орындалу ретіне, презентацияның анықтығына, логика мен жүйелілігіне ие, электронды оқулықты математика сабағында қолдану мүмкіндік береді: оқу процесін жүзеге асырады мультимедиялық мүмкіндіктердің молдығына байланысты неғұрлым қызықты, айқын, креативті; оқытудың көрнекілік мәселесін тиімді шешу; оқу материалын студенттерге қол жетімді ете отырып, оны көрнекілендіру мүмкіндіктерін кеңейеді. Электрондық оқулық - бұл жай оқулық емес, пән мұғалімін алмастыра алатын өзіндік нұсқаулық.

Түйін сөздер: электрондық оқулық, педагогикалық инновациялар, электронды контент, қашықтықтан оқыту, инновациялық өнім, оқу материал

ЭЛЕКТРОННЫЙ УЧЕБНИК ПО МАТЕМАТИКЕ КАК ИННОВАЦИОННЫЙ ПРОДУКТ В УСЛОВИЯХ ДИСТАНЦИОННОГО ОБУЧЕНИЯ

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Аннотация. Дистанционный формат обучения актуализировал приоритеты электронного представления учебного материала по математике. В данной работе рассматриваются основные критерии создания и содержательного наполнения электронного учебника как инновационного продукта. Дана характеристика учебника нового поколения, технологического, основной объем которого составляют инновационные технологии обучения с компьютерной поддержкой. Такой подход будет способствовать повышению уровня технологической культуры в системе высшего математического образования, что характерно требованию к образовательному процессу высокоразвитых государств. Основной показатель высокого качества обучающей программы – это эффективность обучения. Системная работа по использованию современных инновационных технологий и их элементов в образовательном процессе способствует повышению качества знаний по предмету. Электронный учебник по математике обладает уровнем художественного оформления, полнотой информации, качеством методического инструментария, качеством технического исполнения, наглядностью, логичностью и последовательностью изложения, использование электронного учебника на уроках математики позволяет: сделать процесс обучения более интересным, ярким, увлекательным за счёт богатства мультимедийных возможностей; эффективно решать проблему наглядности обучения; расширить возможности визуализации учебного материала, делая его доступным для студентов. Электронный учебник – это не просто учебник, а самоучитель, способный заменить преподавателя-предметника.

Ключевые слова: электронный учебник, педагогические инновации, электронный контент, дистанционное обучение, инновационный продукт, учебный материал.