METHODOLOGY OF DEVELOPMENT AND IMPLEMENTATION OF EDUCATIONAL GAMES IN THE EDUCATIONAL PROCESS OF SECONDARY SCHOOL

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МЕТОДИКА РАЗРАБОТКИ И ВНЕДРЕНИЯ В УЧЕБНЫЙ ПРОЦЕСС СРЕДНЕЙ ШКОЛЫ ОБУЧАЮЩИХ ИГР

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Abstract. This article discusses the methodology of creating and implementing educational games in the educational process. The key point is to apply an iterative software development model. The description of the life cycle of the model is analyzed in detail, in stages. There are examples of using the program at various stages of the lesson.

Аннотация. В данной статье рассматривается методология создания и внедрения развивающих игр в образовательный процесс. Ключевым моментом является применение итеративной модели разработки программного обеспечения. Описание жизненного цикла модели анализируется подробно, поэтапно. Также есть примеры использования программы на различных этапах урока.

Keywords: educational game, game development, iterative model of software development, computerization, program structure, activation of activity.

Ключевые слова: образовательная игра, игровое развитие, итерационная модель разработки программного обеспечения, компьютеризация, структура программы, повышение активизации.

According to the order of the Ministry of Education and Science of the Russian Federation dated 28.07.2005 “On the implementation in 2005 of the project “Supply of computer equipment to urban and village schools of the Russian Federation”, the global computerization of Russian education began. Since this time computer science classes have been equipped with computer technology in almost every school, and every child has received the right to study information technology not only from a theoretical but also from a practical point of view.

The high rate of development of information technologies has created a contradiction between the level of availability of computers and the degree of interest of students in the educational process. In other words, the more time a child spends using gadgets, the more difficult it is to interest him in the use of computer technology in the learning process. Taking into account the indicated

urgency of the problem, we have identified the object of research (educational games in the educational process) and the subject of research (methodology for developing educational games).

We hypothesized that the solution to this problem is the introduction of educational games into the educational process since they have some advantages:

- firstly, each teacher can develop a game that meets his needs and needs, which will contribute to achieving the goals and solving the tasks of the lesson;

- secondly, by developing the game independently, the teacher fully controls the gameplay, can adjust the program to the level and features of the class;

- thirdly, educational games are not widespread enough at the moment, therefore, their introduction will significantly increase the interest of students in the subject;

- finally, during the game, learning takes place unobtrusively, which does not cause psychological rejection in the child and leads to more effective assimilation of the material.

However, for the game to perform its functions in the lesson, special attention, in our opinion, should be paid to the process of its development. This article proposes a methodology for the development and implementation of an electronic training program in the educational process based on an iterative software development model. It includes the following cycles: 1) planning; 2) creation of basic functionality; 3) version testing; 4) analysis and correction of functionality; 5) testing of an improved product. This model allows you to create a simple game (for example, with one level of difficulty), test it, and then, taking into account all the shortcomings, gradually improve the program (add difficulty levels, change the types of tasks, limit the task execution time).

During the first stage – planning – the goals and objectives of the program are set; the category of students is determined (junior, middle, senior level of training); didactic work is carried out (the general content of the game is what topics will be covered, what types of practical tasks will be performed by students); the choice of technical means of software implementation is made. The second stage - the creation of the basic functionality of the program - ensures the development of minimal game features: for example, one level of difficulty, no time limit on the task, the simplest interface. After testing the game with the basic functionality, the teacher determines which learning tasks cannot be solved with this version, whether branches from the game scenario are possible, etc. Further, the program is being improved, and with the right development process, there is no need to rewrite most of the code again – the program is being finalized based on an existing database. These iterations make it possible to infinitely complicate and supplement the content of the program, which allows the teacher to be ahead of time, thereby fulfilling the state order of education.

As an example, we describe the developed educational game in the genre of "quest" in computer science for middle school students.

At the first stage of the development of this software, the following goals were defined: 1) assimilation and consolidation of previously studied material; 2) development of skills for practical problem-solving in computer science; 3) preparation for the OGE in computer science. The target audience for passing the game were students of grades 7-9. To write the program code, the Adobe Flash platform was chosen, which allows you to work with vector, raster and three-dimensional graphics, using a graphics processor, and also supports bidirectional audio and video streaming.

In addition, we have also defined the structure of the product: interface, plot and content. The game plan is to find the "keys" that open the room in which the player is locked. The sequential passage of all levels ensures the player's "exit" from the maze. "Keys" from an educational point of view are computer science tasks structured "from simple to complex". For example, the first level is a logical puzzle and can be attributed to the type of "warm-up" exercises. The next level is aimed at developing knowledge on the topic of "Number systems", and to pass it, the player needs to convert a binary number to a decimal; the result of the translation is a combination to the safe where the key to the door lies.

Consider the menu of the basic version of the program. It includes one level of difficulty, game rules, background music settings. The game consists of 10 tasks aimed at fixing the following topics: Information and information processes, the Basics of algorithmization, Modeling and formalization, etc.

The next iteration of the development of the training game allowed us to add the following elements: 3 levels of difficulty (easy, medium, hard); a 5-minute task limit (if students fail to complete the task in a set time, the level is considered not passed and requires a restart); the choice of musical accompaniment. The implementation of this version made it possible to use the game more individually, based on the level of knowledge of each student. Thus, if the basic version was intended mainly for collective forms of work, then the iteration led to the individualization of the application of the game based on the level of knowledge of each student, that is, already at this stage, the teacher can differentiate the learning process, which is an undoubted advantage.

During the next cycle of program development, we developed categories of tasks for different classes (grades 7-9), which allowed us to concretize the material per the curriculum of each level of training. A "hint" was also added, containing an excerpt from the theoretical material for each task. So, for example, the hint to the tasks on the topic "Number systems" includes the basic rules for translating numbers from one number system to another. The hint does not contain a direct answer or precise instructions for action, still forcing the player to choose from the provided list of rules the one that suits exactly his task.

Thus, we have developed a multi-level educational game that can be used at various stages of the lesson.

For example, when explaining new material, the teacher may open a level with a task unfamiliar to students. Posing the question "how do we solve such problems?" or "how do we open this room?" motivates students to study theoretical material on the topic of the lesson to pass the level of the game.

At the stage of updating knowledge or consolidating previously studied material, the teacher offers students to complete several tasks collectively (the level of complexity is determined by the expected level of knowledge in the classroom) or individually (the level of difficulty is determined for each student individually. Upon completion of the selected level, the teacher can evaluate the results of the work in the lesson, identify the most active students, identify topics that have not been learned well enough.

At the stage of knowledge control, students are offered an independent passage of the selected level with the fixation of the results. Difficulty levels allow you to differentiate the work, and evaluate knowledge more objectively. In addition, the program can be used to diagnose the residual knowledge of students at the beginning of the academic year.

Speaking about the disadvantages, we note that game development is a rather time-consuming process from a technical point of view, which requires the teacher to have in-depth programming knowledge and experience in creating various elements using raster and vector graphic editors. In addition, it is necessary to know and be able to organically introduce gaming activities into the educational process, since the incorrect organization of the lesson, the teacher's detachment from the students and the gameplay, the absence of the intended goals of the game ("game for the sake of the game") will not allow students to immerse themselves in the atmosphere of the game, and, consequently, to achieve the educational, educational and developmental goals of the lesson.

In conclusion, we note that the use of educational games in computer science lessons had a positive impact on learning outcomes, contributed to the individualization of the learning process, activated the activity of students, and also found an emotional response in students, from which it follows that the hypothesis put forward by us has been proven.

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