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THE ROLE OF EDUCATIONAL GAME TECHNOLOGIES IN THE EDUCATIONAL PROCESS

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Abstract: This article describes the use of game technologies in the educational process, its advantages and disadvantages. The impact of the use of various game technologies on the educational process is discussed in the educational process.

Keywords: "Sphere", "mirror", game technologies, gamification, game-based learning, webquest, educational outreach, STEM education.

INTRODUCTION

The learning process includes communication between the teacher and the student in various lessons, as well as in the acquisition and application of knowledge, skills and abilities. During the learning process, the teacher's task is to explain the material to the students in an easy and understandable way and to have a clear idea of the student's current knowledge during the lesson, otherwise the information given will be incomprehensible [1]. Thus, the issue of choosing teaching tools and organizing communication between the student and the teacher is an urgent issue. Due to its convenience and comprehensibility, educational game technology can become such a tool as a method of implementing cognitive strategy.

MAIN PART

A number of scientists promote the game as an independent field of education. Children's knowledge of the world through play ("sphere") is reflected in Friedrich Froebel's "Sphere" theory, in which play activity has a didactic value and, according to F. Frobel, it should have an educational character. "His field theory combines philosophical and pedagogical ideas, and the game should become a form of education for children. Unlike activities performed by adults and "foreign" to children, play is a familiar form of activity for them [1]. The Soviet researcher D.B. Elkonin explains the game as an activity that appears at a certain stage, one of the leading forms of the development of mental functions, and one of the methods of the child's study of the adult world. K.D.Ushinsky proves the didactic value of the game in Russia, saying that the game occupies a large place in the life of the child and that it is more interesting to be in the game than the reality of the world around him [2]. The pedagogical phenomenon of students' games is interpreted in the works of A.S.Makarenko and V.A.Sukhomlinsky [3]. His education takes place in the game, and how he behaves in the game is how he behaves in many ways in his future career [4, p. 136]. V.A.Sukhomlinsky described the game for children as a "mirror" through which the child gets an idea of the world around him [5].

The game is defined by scientists as one of the main activities of primary school age [3]. Educational experts say that play is the language of communication

that children speak and understand [6]. Play is such an important part of a child's life that the right to play, along with the basic needs of nutrition, health, protection and education, is enshrined in law in the Declaration of the Rights of the Child [7]. Junior school age is determined by studying in primary school, an external factor (from 6-7 to 9-10 years - determined for grades 1-4). This period is the basis for the development of creativity in a child and the formation of a moral and aesthetic attitude to life, and the personal characteristics and qualities formed at this age remain almost unchanged [8]. According to V.V.Davydov, based on educational activities, junior schoolchildren develop theoretical awareness and thinking, develop relevant abilities (thinking, analysis, mental planning), as well as learning needs and motivations [11]. Educational activities at primary school age affect and determine the character of other activities, such as play, work and communication. At this age, children's games have a constructive character, and their form and content change. Children can apply new knowledge in games [9]. At this age, play takes the leading place after educational activities and continues to influence children's development. The use of games by teachers in educational activities with junior schoolchildren provides an opportunity to better learn the material. This creates the effect that students gain new knowledge or practice acquired skills during the game [10]. Thus, the game can be used as a teaching tool for elementary school students. The concept of "game technologies" is "an integral part of pedagogical technologies, which allows to make the period of learning subjects and the work of students interesting and exciting at the creative and research level" and includes a wide group of methods and technologies for organizing the pedagogical process. Includes. The pedagogical essence of game technologies is to activate thinking, increase the independence of students and ensure a creative approach to learning [2]. The concept of "game technologies" can also include pedagogical technologies of "gamification" and "game-based education".

The concept of "gamification" ("gamification") was first used in the field of information technology in 2002-2003, when the British game developer Nick Pelling founded a consulting firm for the creation of game interfaces for electronic devices [12]. The concept of "gamification" became widespread in 2010 as a game technique that can be used in the social sphere, including education. Today, there are several interpretations of the term "gamification".

Table 1 - the content of the concept of "Gamification".

The author	Concept structure
Werbach K., Hunter D. [13]	Using game elements and game mechanics in a non-game context
Vetushinsky, A. S. [12]	A methodology of using metagame elements and mechanics to adjust human behavior by creating a favorable emotional background
V. V. Grinshkun, O. Yu. Zaslavskaya, V. S. Kornilov and others [14]	Increasing the motivation of learners through non-standard elements of interaction with them

From the above definitions, we can conclude that gamification is a system of using game elements in non-game activities to achieve set goals.

According to K.Werbach and D.Hunter, gamification consists of three categories of game elements: dynamics, mechanics, and components forming a pyramid (Figure 1) [13], where dynamics are general concepts that should be considered when working with a gamified system. Game dynamics include: constraints, emotions, stories, development, and relationships.
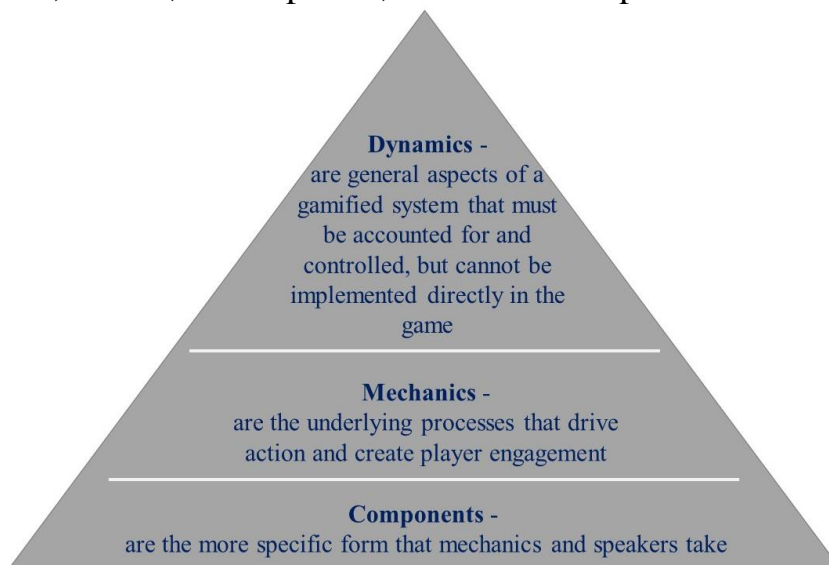
Dynamics -
are general aspects of a gamified system that must be accounted for and controlled, but cannot be implemented directly in the game

Mechanics -
are the underlying processes that drive action and create player engagement

Components -
are the more specific form that mechanics and speakers take

Figure 1 - Game elements [13, p. 60]

Game components are a specific form of mechanics and dynamics that can be used in education, let's highlight the elements that can be used in education: achievements, avatars, badges, collection, access to content, awards, ratings, levels, points, quests, social profile, teams, goods [12]. Gamification is considered both as a means of increasing student motivation and as a form of structuring the learning process [15]. When developing a game system, the teacher sets goals based on game dynamics, builds the learning process from game components based on game mechanics.

Depending on the scope of application of game elements and mechanics, three types of gamification can be used in teaching elementary school students [6]:

➢ Lesson gamification: this type is characterized by the use of gamification within a specific lesson;

➢ Gamification of the course involves creating a game system for a limited time within one topic;

➢ Gamification of education: this type is characterized by the use of gamification in combination with several courses and is a meta-theme. Gamification of education can include STEM educational technology.

RESULTS AND DISCUSSION

Studies show that the introduction of gaming technologies has a positive effect on students' interest in computer science and programming [15].

Game-based education is considered as a set of modern teaching tools, which is based on the concept of learning through fun [16]. A distinctive feature is that game-based learning improves skills within a specific game, incorporates game elements into the educational process without replacing them. Pedagogical games are considered as products of game learning, as specially created situations of simulated

reality, in which students are asked to find a way out. Unlike games, a pedagogical game has an important feature - a clearly defined educational goal and a corresponding pedagogical result, which can be characterized by justification, clearly distributed and educational-cognitive direction. The game form of lessons is created using game techniques and situations in lessons, the main purpose of which is to stimulate cognitive interest in learning activities, as a result of which knowledge is absorbed faster [2; 3].

A didactic game can also be a means of organizing conditions for joint cooperation of students based on communicating with each other to achieve results.

There is a classification of educational games. These are:

➢ by type of activity;
➢ according to the nature of the pedagogical process;
➢ according to the nature of the game technique [16, p.129];
➢ with the presence of competition [6];
➢ by composition and number of players [16].

As one of the most widely used forms of pedagogical games in lessons, didactic or educational games are distinguished on the following grounds:

➢ on educational content;
➢ according to the level of cognitive activity of children in the game [18];
➢ on ways to organize and interact with students [18];
➢ on the role of the teacher in game activities [19].

A didactic game introduces an element of competition into the educational process [20]. According to A.Yu.Fedosov, didactic computer games make the process of learning computer science open and attractive for children of preschool and primary school age, they allow to present didactic material in the form of a game, which makes learning during the game allows to solve the problem [21].

An example of a didactic computer game is a web quest, the use of which increases the effectiveness of the educational process, diversifies the activities of students and serves to successfully solve the problems of teaching, learning, development and socialization. Aryutkina S.V. and Napalkov S.V. define the web quest as "the content of the educational topic, the goals and tasks of its study, and which includes the performance of educational and cognitive tasks for students to search and select information using Internet resources. "information content, systematization and generalization of the studied material, its enrichment and presentation as a whole system". Another example of the implementation of game-based education in computer science is the PictoMir software system and the "Basics of Programming" curriculum for preschool and elementary school students.

Like gamification, Russian experts emphasize the following game components of game-based learning [6]. The dynamics of the experience force you to participate in the game and continue it, such dynamics can be: racing, survival, rescue, exploration, travel, creation. Mechanics is a way of interacting with game elements within defined restrictions (rules). This changes the current state of the game and affects its further development. For example, shoot and drag (game element: cube and playing field), sea battle (game element: coordinate grid), tic-tac-toe (x's and 0's; game element: field and numbers). A setting is the game shell of an ongoing activity

that complements and supports the game mechanics. The setting also includes the physical parts of the game.

It should be noted that the terms "gamification" and "game-based learning" have common characteristics [6]:

1. Having a purpose. In the context of the game, educational and game goals are set, where the teacher is given an educational goal, and the student (player) may not know about it, and before developing the game component, the game is taken into account by the teacher and the goal of the game is set before the student (player), helps to control the behavior of the player and is related to the experience that the player receives;

2. Game-based learning and gamification require feedback. Feedback informs the student about the learning outcome, the success of his game strategy and motivates the student;

3. The content of the game is optional, the teacher should not force students to participate in the game;

4. Game content means that the player has a choice, that is, a situation with several different solutions;

5. The presence of pleasure and participation in the gamer describes a state of "flow" written by Mihaly Csiksentmihalyi, a researcher in the field of positive psychology. Flow occurs when the level of complexity of the task and the ability to solve it are at the same, relatively high level. This equilibrium is called the "flow zone". Flow is an optimal state of internal motivation in which a person achieves a mental state of full attention and immersion in the activity, a state of loss of self-awareness, a sense of mastery of the task, and an accelerated transition characterized by a sense of time. Thus, flow can be a symbol of student motivation and involvement in the learning process.

One of the most important aspects of effectively using gaming technology, especially gamification, is understanding what motivates people. For this, according to the theory of R.A. Bartl, a professor and creator of the world's first multiplayer online game, game technology objects (for example, students) are perceived as players. Based on E.Desi and R.Raine's theory of self-determination, according to which humans have innate needs for autonomy, competence, and belonging, and D.Pink's classification, replacing competence with the concept of "meaning," A.Marjewski develops a player typology that includes six types of players (Figure 2).
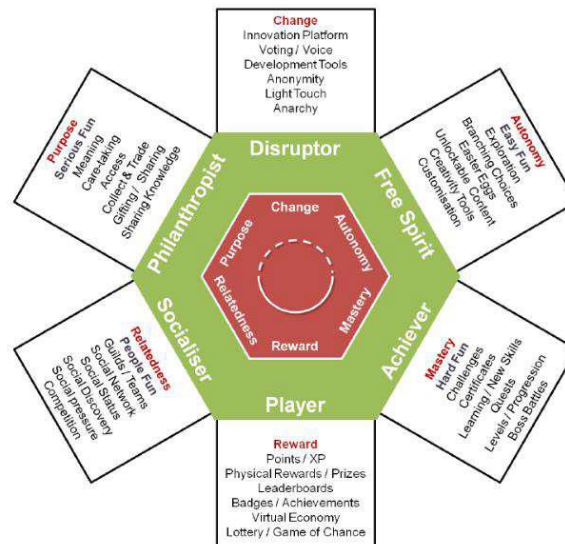
Figure 2 - Typology of players by A. Marzhevsky - Hexada

The gamer is the type of player with the most obvious extrinsic motivation, the goal of the players is prizes and victories, and the essence of the game does not matter. Socializer - For this type of player, the purpose of the game is communication. Free-spirited - this type of player is characterized by a desire to explore. Such players tend to perform creative tasks. Successful - this is the type of player who strives for mastery, for whom the goal of the game and the components of the game are important: points, competitions. Philanthropist - this type of player's preferred activity is helping others and sharing experiences. The philanthropist prefers the role of "mentor" in game activities. Rebel - this type of player looks for weaknesses in games or people and tries everything to the limit. It is possible to cooperate with the insurgents by means of debugging tasks. Taking into account each type of player, the teacher organizes educational activities when building a game system (Table 2).

Table 2 - Types of players and their motivation

Player type	Game components
Player	Achievements, levels, points, competitions
Socializer	Social profile, communities
Free-spirited	Badges, achievements, gifts, access to content
Successful	Scores, competitions, rankings, ranks
Philanthropist	Access to content (for mutual assistance), commands
Rebel	Access content (to find errors)

By analyzing the composition of students in the group during the game, the teacher determines the type of player of the students and can use them in the development of tasks in the future. The trend of informatization of education has influenced game technologies. Computer games are used as didactic games in game-based education [14], they can serve as applications, websites as a means of information transfer. Game elements are reflected in electronic platforms that can be used in educational activities, for example, ClassDojo. According to T.N.Noskova, the advantages of using digital resources for the student are "increasing the activation

and productivity of educational activities, as well as expanding their scope when interacting with digital content. The main semantic meaning of interactivity is to give the student the opportunity to control the process of mastering the content of science. Through the use of various digital tools, interaction with educational resources becomes individualized and effective. In addition, digital resources facilitate information visualization, which implies "enhancing the use of graphical representations of abstract information and knowledge". Noskova notes that interaction with educational resources in the digital environment has the following characteristics:

➢ the student interacts with the learning resource through a computer interface;

➢ can happen at different times;

➢ interaction occurs using computer-defined interaction algorithms.

In order to fully use the high information potential of the new educational environment, these features should be taken into account by teachers.

It should be noted that "the biggest challenge in learning programming is understanding the logic of programming". Thus, the question arises as to the need for a gaming tool that provides educational benefits and includes the appropriate software. It is especially important to create a play-based learning environment that focuses on the achievement of planned learning goals for junior school students. Such a tool can be the Scratch programming language and the visualization environment, which are becoming popular in teaching programming to elementary school students.

CONCLUSION

Thus, we can conclude that "gamification" and "game-based education" can be included in the concept of "game technologies", which are pedagogical technologies and game forms. As L.S. Vygotsky noted, "the school leaves very little room for play, it immediately imposes on the child an approach to any activity using adult methods. The transition from play to adult activity is very abrupt; there is an unfilled gap between free play and school activities [18]. Game technologies can serve as such forms of transition. The analysis of the literature showed that games as a method of learning can be integrated into the educational process with the help of game technologies: games and game-based education. Despite the general similarity, it is necessary to emphasize the usefulness of each of the definitions. Thus, the description of the term "gamification" shows that gamification can be used to explain the theory, the relationship of the whole course. Game-based learning is effective for developing knowledge and skills within a specific game.

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