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HOW THE USE OF GAME FORMS OF LEARNING CONTRIBUTES TO THE INCREASE IN THE ACTIVITY OF STUDENTS IN MATHEMATICS LESSONS IN DISTANCE LEARNING

Abstract. The purpose of the research is to study the influence of game forms of teaching on increasing students' activity in mathematics lessons in a distance mode and on increasing students' activity through the use of game forms. The study involved 51 students in grade 7, 25 teachers shared the types of games used in the lesson, as well as methods. Having online lessons in a playful way allows the teacher to set learning objectives outside the box, which increases students' interest in learning and application in the classroom, contributing to the rapid achievement of learning goals. Based on the results of the analysis of pedagogical literature, the definition of game technology in relation to mathematical disciplines was formulated: it is a complex of pedagogical tools, methods, and forms that contribute to an increase in the cognitive activity of students, the main of which will be original tasks, a variety of didactic and methodological techniques and game situations in practical classes.

Keywords: distance learning, game-based learning format, student activity in the classroom, interactive applications, online lesson.

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Аңдатпа. Зерттеудің мақсаты қашықтықтан оқыту режимінде математика сабақтарында оқушылардың белсенділігін арттыру үшін оқытудың ойын формаларының әсерін зерттеу болды. Және ойын формаларын пайдалану арқылы оқушылардың белсенділігін арттыру болды. Зерттеуге 7 сыныптың 51 оқушысы қатысты, 25 мұғалім сабақ барысында қолданатын ойын түрлерін сонымен қатар әдіс тәсілдерімен бөлісті. Онлайн сабақтарды ойын түрінде өткізу мұғалімге оқу міндеттерін стандартты емес түрде қоюға мүмкіндік береді, бұл оқушылардың сабақта білім алуға және қолдануға деген қызығушылығын арттырады, осылайша оқу мақсаттарына тез қол жеткізуге ықпал етеді. Педагогикалық әдебиеттерді талдау нәтижелері бойынша ойын технологиясының математикалық пәндерге қатысты анықтамасы тұжырымдалды: бұл студенттердің танымдық белсенділігін арттыруға ықпал ететін педагогикалық құралдар, әдістер мен формалардың кешені практикалық сабақтарда өзіндік тапсырмалар, әр түрлі дидактикалық-әдістемелік техникалар мен ойын жағдайларында есепті тиімді шығара алуы.

Түйін сөздер: қашықтықтан оқыту, оқытудың ойын форматы, сабақтағы оқушылардың белсенділігі, интерактивті қосымшалар, онлайн-сабақ.

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Аннотация. Цель исследования - изучить влияние игровых форм обучения на повышение активности студентов на уроках математики в дистанционном режиме и на повышение активности студентов за счет использования игровых форм. В исследовании участвовал 51 ученик 7 класса, 25 учителей поделились типами игр, используемых на уроке, а также методами. Проведение онлайн-уроков в игровой форме позволяет учителю нестандартно ставить учебные задачи, что повышает интерес учащихся к обучению и применению в классе, способствуя быстрому достижению целей обучения. По результатам анализа педагогической литературы сформулировано определение игровой технологии применительно к математическим дисциплинам: это комплекс педагогических средств, методов и форм, способствующих повышению познавательной активности студентов, основными из которых будут оригинальные задачи, разнообразные дидактико-методические приемы и игровые ситуации на практических занятиях.

Ключевые слова: дистанционное обучение, игровой формат обучения, активность учащихся на уроке, интерактивные приложения, онлайн-урок.

Introduction

The prevailing epidemiological situation in all countries demanded a revision of the paths of education, and in the educational sphere, distance learning has taken an important role. The shift to distance learning has led to a revision of a number of traditional teaching methods. The relevance of this type of training lies in the fact that new opportunities are opening up for mastering modern pedagogical and information technologies; for organizing the educational process in a distance mode, as well as expanding the information space and the field of education. The study of the emerging problems of distance learning is relevant for the current period of time. In this study, the main focus was on synchronous online learning. “Online learning (synchronous interaction) is a type of educational activity in which classes are conducted using the Internet in real time” [1].

Learning from digital games is one of the most important approaches in education and lifelong learning. Also, the promotion of active learning using technological devices and the Internet is a promising solution to some of the problems prevailing in traditional education.

“In accordance with the target orientations, the following main groups of pedagogical games are distinguished:

- *didactic:* broadening one's horizons, cognitive activity; application of knowledge, abilities, skills in practical activities; the formation of certain skills and abilities necessary in practical activities; development of general education skills and abilities; development of labor skills;
- *educating:* education of independence, will; the formation of certain approaches, positions, moral, aesthetic and ideological attitudes; education of cooperation, collectivism, sociability, communication;
- *developing:* the development of attention, memory, speech, thinking, the ability to compare, contrast, find analogies, imagination, fantasy, creativity, empathy, reflection, the ability to find optimal solutions; development of motivation for learning activities.
- *socializing:* familiarizing with the norms and values of society; adaptation to environmental conditions; stress control, self-regulation; communication training; psychotherapy" [2].

Allocating more time to thoroughly prepare for lessons, choosing a form and method of conducting a lesson, testing students' knowledge have become key points for a successful lesson in a distance learning format.

The relevance of research. The study of the emerging problems of distance learning is relevant at the present time. In this study, the main focus was on synchronous online learning.

At the beginning of the school year, in practice, difficulties arose in motivating and maintaining the activity of students in online lessons. The problem that arose prompted me to carefully research my practice and to improve it. The problem of the research is to find approaches to increasing the involvement and activity of students in mathematics lessons in distance learning, using gaming technologies. "Games can offer a platform for effective skill practice, as learning is most rewarding when it is proactive, positioned, problem-based, experiential, requires higher-order thinking, and provides immediate feedback.

Purpose of the research: to study the influence of game forms of teaching to increase the activity of students in mathematics lessons in a distance learning mode.

The object of research: the educational process in a distance learning mode of the subject of mathematics.

Research subject: the use of various types of game technologies in teaching mathematics.

In accordance with the purpose of the study, the following main tasks have been identified:

1) determine the game forms that contribute to the achievement of the goals of the lesson;

2) organize and check the effectiveness of the use of game forms of learning in online lessons;

3) analyze the data obtained for the effectiveness of the forms of organization of training;

4) conclusion

Expected results:

1) increasing the cognitive interest of students in the subject;

2) increasing the activity of students in the classroom through the use of game forms of teaching;

3) improving the ICT competencies of students.

Research questions and methods. To achieve the goal of the lesson research, we used:

- theoretical research methods: a survey (a survey was conducted among teachers and students), analysis, comparison, and generalization of the data obtained.

- experimental research methods: direct and indirect pedagogical observation of the educational process, pedagogical experiment.

Theoretical and methodological foundations of the study:

Theoretical issues of gaming technologies were the subject of a special study and were reflected in the works of N.G. Alekseeva, B.G. Ananyeva, V.M. Demina, M.S. Kagan, V.I. Ustinenko, G.P. Shchedrovitsky, V.A. Yakovleva, and others. The psychological analysis of the game was given in due time by L.S. Vygotsky, A.N. Leontiev, C.JL Rubinstein, D.B. Elkonin.

In the process of research in action relied on works:

The theoretical foundations of the use of distance learning are explored in the works of A.A. Andreeva, P.P. Belenky, A.M. Bershadsky, S.A. Beshenkova, V.V. Verzhbitsky, V.G. Kineleva, E.S. Polat, S.A. Shchennykova, and others; The works of SV are devoted to the organization of the educational process using distance learning technologies. Aleksakhina, E.V. Burmistrova, V.I. Baydenko, L.A. Berezovskaya, V.P. Bespalko, V.V. Gura, Yu.L. Derazhne, V.D. Shadrikov, CE. Shishova, V.A. Yarovenko and others [3];

At the first stage, theoretical, the literature on the research topic was studied and analyzed in order to substantiate the relevance of the problem in the theoretical aspect. A methodology for experimental work was developed, during which questions of the survey and conversations were formulated.

At the second, experimental-experimental stage, the main place was taken by a formative experiment, in the process of which the goal of the study was achieved, the effectiveness of game forms of learning was revealed.

At the third, final stage, the analysis and generalization of the experimental results, statistical processing of the results obtained and the formulation of conclusions were carried out.

Methodology

2.1 The types of games that were used during the lesson

"Games can offer a platform for effective skill practice, as learning is most fruitful when it is proactive, positioned, problem-based, empirical, requires higher-order thinking, and provides immediate feedback" [4].

Learning from digital games is an approach to education and lifelong learning, and promoting active learning through technological devices and the Internet is a promising solution to some of the problems prevailing in traditional learning.

To increase the cognitive activity of students in the classroom, rebuses and integrative game applications were used. Games were organized in the form of individual and group work of students.

- *Rebus when studying the topic "Triangle" (Fig. 1).*

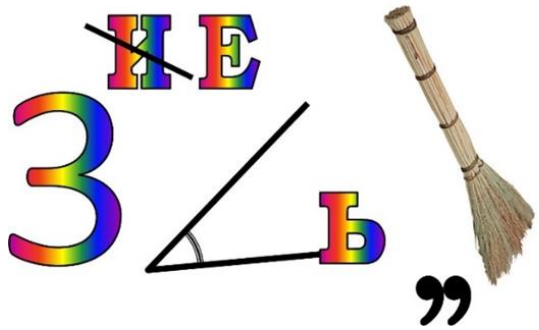

Figure 1. Rebus

- *In the lessons, tasks were used (Fig. 2) from the training platform Liveworksheets.com*

Try These

S.N	QUESTIONS	ANSWERS
1	$(p + 2)^2$	$p2 + 4p + 4$
2	$(3 - a)^2$	$9 - 6a + a^2$
3	$(6^2 - x^2)$	$(6 + x)(6 - x)$
4	$(a + b)^2 - (a - b)^2$	$a^2 + 2ab + b^2 - (a^2 - 2ab + b^2)$
5	$(a + b)^2$	$(a + b) \times (a + b)$
6	$(m + n)(.....) = m^2 - n^2$	$(m - n)$
7	$(m + ...)^2 = m^2 + 14m + 49$	$(m + 7)^2$
8	$(k^2 - 49) = (k + ...)(k - ...)$	$(k + 7)(k - 7)$
9	$m^2 - 6m + 9 =$	$(m - 3)^2$
10	$(m - 10)(m + 5) =$	$m^2 + (-10 + 5)m + (-10)(5)$

Figure 2. The topic "Formulas of abbreviated multiplication".

- *Educational platforms like Quizizz and Kahoot are the most convenient for collecting and analyzing student performance data (Figure 3 and Figure 4).*

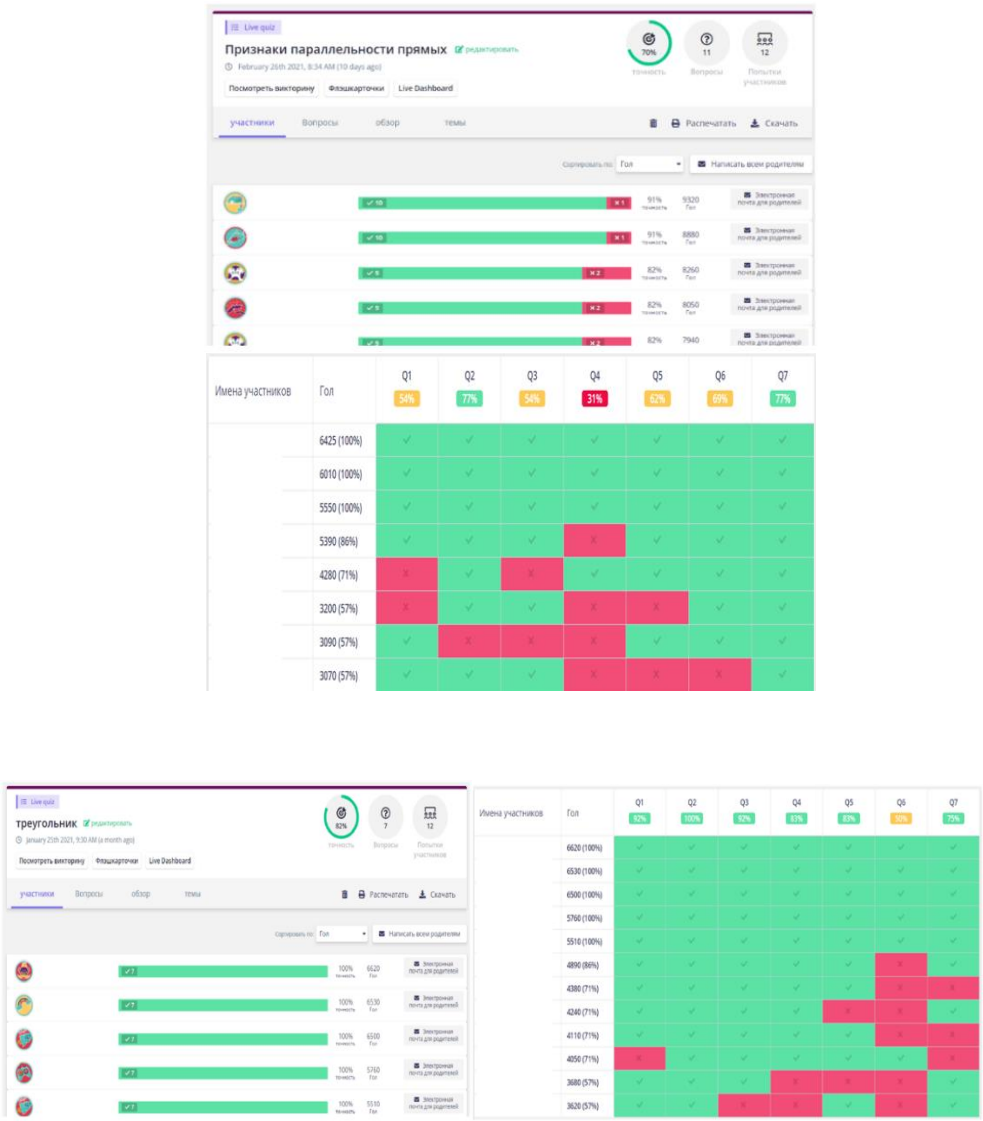

Figure 3. Topic “Signs of parallelism of straight lines" and "Triangles and their types”.

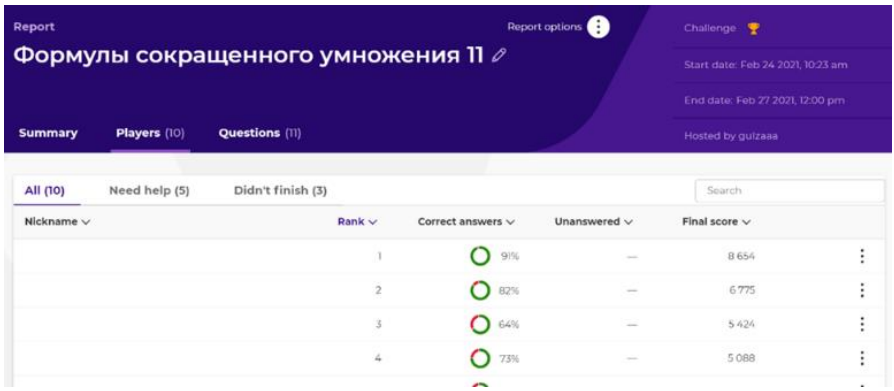

Figure 4. Formulas for abbreviated multiplication.

For the study, 3 students with high, medium and low problem-solving abilities were selected. Student A student with high motivation for learning and activity, student C student with low motivation and activity. The table shows the results obtained from the Kahoot and Quizizz gaming apps, as well as the total number of students participating (Table 1 and Figure 5).

Table 1. Results of passing games of the educational platform.

	Triangles and their types	Total number of participants	Sum and difference of cubes	Total number of participants	Abbreviated multiplication formulas	Total number of participants
	7 question	12 of 12	11 question	12 of 12	11 question	10 of 12
Student A	86 %	100 %	86 %	100 %	91 %	83 %
Student B	100 %		71 %		82 %	
Student C	64%		29 %		64 %	

Analyzing the data obtained, we can come to the conclusion that student results are related to how the student learned a particular topic. The bar graph shows a direct relationship between the assimilation of the material and the achievement of the lesson with the successful completion of the game. However, during the study in action, there were moments when not all students were able to connect to gaming platforms due to technical problems with the Internet and a number of other reasons (Table 1). In general, there is a positive trend in increasing student activity in online lessons.

The results show that digital games are an effective teaching tool in increasing student engagement in math lessons, as learners develop skills and abilities and can get immediate feedback. During the passage of the games, students apply knowledge, abilities and skills in practical activities. With the help of games, cooperation, communication skills in group types of work are brought up; attention, quick reaction, the ability to compare are developed; motivation for learning activities increases. The understanding that achievements in the game are also associated with the learning process comes, for example, through the number of "points" received. The more successful the student is in the game, the better the student's learning outcomes. But failing to play is also effective in helping you learn from your mistakes. By choosing a playful form of learning to achieve the goal, as one of the tools for increasing the involvement and activity of students in the educational process, the goal of the study was achieved.

"Online games keep students engaged, which is a very important aspect of classroom management. Since they are closely related to a range of perceptual, cognitive, behavioral, affective and motivational influences and results" [5].

The competitive gaming moment among the group members and tracking each other's success has a beneficial effect on the overall dynamics of the game and will affect the desire to quickly "beat" your competitor [6].

2.2 Survey

Initially, I asked the question "How to arouse students' interest in the learning process, increase their activity in the lesson, and involve them in the learning process for the exchange and consumption of information in a distance learning mode?" To answer the question, the topic of our research was formulated, and we began to solve the problem in practice.

Based on the studied theoretical material, the choice of further game forms of lesson organization and game technologies was carried out. During the study, we interviewed teachers and students. 25 teachers from 20 to 50 years old took part in the survey. During which it turned out that 84% of teachers use games in the pedagogical process. 28% of teachers actively use games in the educational process, while 40% and 28% use games "Sometimes" and "Rarely", respectively. The remaining percentage of teachers do not use games in the educational process. Frequently used online learning platforms: Quizizz, Kahoot, Nearpod. Role-playing games, puzzles, quizzes are less popular. Teachers prefer to use play at the beginning and end of the lesson. The main goal of the didactic game is to consolidate what has been learned and increase the activity of students in the classroom. Most of the students from the practice of teachers are moderately active in the classroom (Diagram 1).

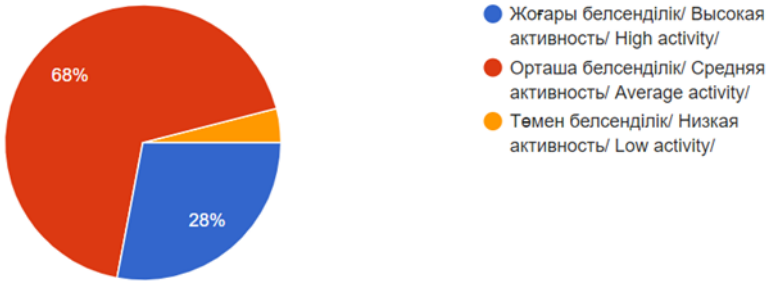

Diagram 1. “What activity do students show in the lesson in the online learning format?”

In most cases, teachers have organizational and managerial difficulties and material and technical problems in organizing a game form of learning in distance learning. To the question “Do children like playing in the classroom?” and “What is the children's reaction to the use of gaming technologies in the classroom?” positive answers were received, stating that students respond positively to the use of various game forms of learning in the educational process.

The survey for students involved 57 students in grades 7-10, aged 11 to 17 years. The majority (84.3%) of those who completed the survey were 7th-grade students. The manifestation of student activity is at an average level (Diagram 2). The data roughly coincide with the answers of the teachers about the activity of the students in the lesson.

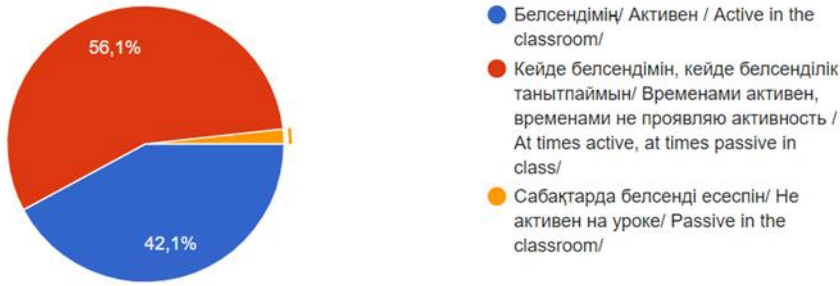

Diagram 2. “How would you rate your activity in the lesson?”

To the question “What is your activity in the lesson?” many students responded that they were “answering questions” and “completing assignments”.

12.3% of students incompletely fulfill the teacher’s assignments and do not ask questions. To the question “Does the online learning process evoke your interest?” 57.6% answered, “Yes”, and the rest of the percentage answered, “No” (Diagram 3).

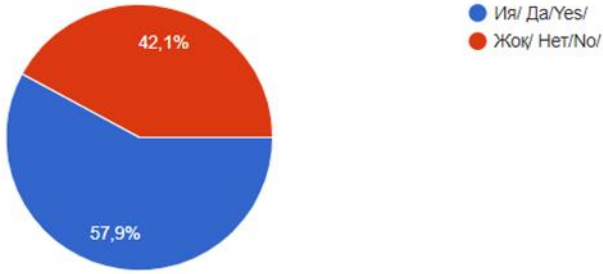

Diagram 3. “Are you interested in the online learning process?”

Most of the students are interested in learning when the lesson is in a playful way. We used these survey results to advance our research. 51 students of the 7th grade took part in the pedagogical experiment. To increase the cognitive activity of students in the classroom, rebuses, integrative game applications were used, among them, the Quizizz and Kahoot applications were most often used during online lessons. When planning lessons, the needs of students were taken into account, respectively, during the online lessons, the goal was set to interest and motivate students to study. Games with students were organized in the form of individual and group work.

The results show that digital games are an effective learning tool in increasing student engagement in math lessons, as learners develop skills and abilities and can get immediate feedback. During the passage of the games, students apply knowledge, skills, and abilities in practical activities. With the help of games, cooperation, communication skills in group types of work are brought up; attention, quick reaction, the ability to compare are developed; motivation for learning activities increases. The understanding that achievements in the game are also associated with the learning process comes, for example, through the number of “points” received. The more successful the student is in the game, the better the student's learning outcomes. But failing to play is also effective in helping you learn from your mistakes. By choosing a game form of learning to achieve the goal, as one of the tools to increase the involvement and activity of students in the educational process, the goal of the study was achieved.

Conclusions and analysis

At the beginning of the classroom, problems arose when student activity in the classroom was below average. The problem that arose prompted me to thoroughly research my practice and improve it. The aim of our research was to study the influence of game forms of learning to increase the activity of students in mathematics lessons in a distance learning mode. By choosing this method of achieving the goal as one of the tools to increase student engagement and activity, we achieved the goal of the study.

Arriving at the conclusion of the research in action, conducting online lessons in a playful way allows the teacher to set educational tasks in a non-

standard form, which motivates and increases the interest of students in obtaining and applying knowledge in the classroom. Conducting online lessons in a playful way allows the teacher to set educational tasks in a non-standard form that motivates, increases the interest of students in obtaining and applying knowledge in the classroom, thereby contributing to the rapid achievement of the set learning goals.

But, in turn, there is no need for further work in this direction. Since you can consider different formats and forms of organizing the lesson in order to improve other weak points in the organization of the lesson, look for other aspects that increase the quality of the lesson and other ways to improve student results in the subject of mathematics.

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