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THE ROLE OF GAME-BASED LEARNING IN IMPROVING EDUCATION AND STUDENT LEARNING

O PAPEL DA APRENDIZAGEM BASEADA EM JOGOS NA MELHORIA DA EDUCAÇÃO E DA APRENDIZAGEM DOS ESTUDANTES

EL PAPEL DEL APRENDIZAJE BASADO EN JUEGOS EN LA MEJORA DE LA EDUCACIÓN Y EL APRENDIZAJE DE LOS ESTUDIANTES

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Abstract. The purpose of this study was to investigate the role of educational games in increasing student learning. One of the new and innovative methods of education is the use of educational games in teaching, in which all students with any culture, intelligence level, and individual differences play it directly and with interest and motivation. By playing games, students can be taught the course and educational content indirectly and practically, and this learning is also deeper and more sustainable because students are interested in learning. This article examines the role of educational games and its importance and impact on student learning. The research method of this study was descriptive-analytical, which was investigated using library resources. The experimental group was affected by the independent variable of education through games, but the control group did not receive any intervention. The research tools used are the Learning Capabilities Questionnaire and the Learning Questionnaire. Finally, the data obtained from the research were analyzed using the univariate analysis of covariance using SPSS 16.0 software. The results of the analysis of covariance showed that game-based learning improved the learning of lesson concepts and increased interest in students (P>0.001). At the end of this study, the game teaching method and its advantages and disadvantages were examined.

Keywords: Game-based learning, education, elementary school, academic achievement, educational game.

Resumo. O objetivo deste estudo foi investigar o papel dos jogos educativos no aumento da aprendizagem dos estudantes. Um dos métodos novos e inovadores de educação é o uso de jogos educativos no ensino, nos quais todos os alunos, independentemente de sua cultura, nível de inteligência e diferenças individuais, participam diretamente com interesse e motivação. Por meio dos jogos, os estudan-

tes podem aprender o conteúdo das disciplinas de forma indireta e prática, resultando em uma aprendizagem mais profunda e sustentável, devido ao interesse dos alunos pelo aprendizado. Este artigo analisa o papel dos jogos educativos, sua importância e impacto na aprendizagem dos estudantes. O método de pesquisa utilizado foi descritivo-analítico, com base em recursos bibliográficos. O grupo experimental foi submetido à variável independente de ensino por meio de jogos, enquanto o grupo de controle não recebeu nenhuma intervenção. Os instrumentos de pesquisa utilizados foram o Questionário de Capacidades de Aprendizagem e o Questionário de Aprendizagem. Os dados obtidos na pesquisa foram analisados por meio da análise univariada de covariância, utilizando o software SPSS 16.0. Os resultados da análise de covariância demonstraram que o ensino baseado em jogos melhorou a compreensão dos conceitos das aulas e aumentou o interesse dos estudantes (P>0,001). Ao final do estudo, foram examinadas as vantagens e desvantagens do método de ensino por meio de jogos.

Palavras-chave: Aprendizagem baseada em jogos, educação, ensino fundamental, desempenho acadêmico, jogo educativo.

Resumen. El propósito de este estudio fue investigar el papel de los juegos educativos en el aumento del aprendizaje de los estudiantes. Uno de los métodos nuevos e innovadores de educación es el uso de juegos educativos en la enseñanza, en el que todos los estudiantes con cualquier cultura, nivel de inteligencia y diferencias individuales lo juegan directamente y con interés y motivación. Al jugar juegos, los estudiantes pueden aprender el curso y el contenido educativo de manera indirecta y práctica, y este aprendizaje también es más profundo y sostenible porque los estudiantes están interesados en aprender. Este artículo examina el papel de los juegos educativos y su importancia e impacto en el aprendizaje de los estudiantes. El método de investigación de este estudio fue descriptivo-analítico, que se investigó utilizando recursos de la biblioteca. El grupo experimental se vio afectado por la variable independiente de educación a través de juegos, pero el grupo de control no recibió ninguna intervención. Las herramientas de investigación utilizadas son el Cuestionario de Capacidades de Aprendizaje y el Cuestionario de Aprendizaje. Finalmente, los datos obtenidos de la investigación se analizaron mediante el análisis univariante de covarianza utilizando el software SPSS 16.0. Los resultados del análisis de covarianza mostraron que el aprendizaje basado en juegos mejoró el aprendizaje de los conceptos de la lección y aumentó el interés de los estudiantes (P> 0,001). Al final de este estudio se examinó el método de enseñanza del juego y sus ventajas y desventajas.

Palabras-clave: Aprendizaje basado en juegos, educación, escuela primaria, logro académico, juego educativo.

1. INTRODUCTION

Getting children who are all about games interested in the learning and teaching environment is a challenge for elementary school teachers. Educational games are an important part of the education process for students at this stage. Today, advances in science and technology have had an impact on teaching and learning methods. So that the results of technological innovations have provided a new generation of educational tools to help students learn. Computer science and communications play an important role in today's society. In fact, society in the 20th century has become increasingly computerized, requiring everyone to have computer knowledge and skills (Xu et al., 2023).

Traditional learning approaches have undergone fundamental changes with the emergence of new technologies such as computer technology, and today, measures have been taken in most countries to use computer technology in educating students (Dahalan et al., 2024). Especially students at lower levels, due to their objective thinking, need methods that are more objective. Computer education, by its nature, uses the two senses of sight and hearing of the student and makes the lesson diverse and entertaining for the student (Cheng et al., 2023). It

will be more effective if the acquisition of knowledge and skills is through media education. For example, when computer games are used in teaching, different skills are developed in students that are not possible with traditional teaching (Sun et al., 2023).

According to studies, in European schools, teachers use computer games for teaching. Fonseca et al., (2023). Meccawy et al., (2023) research proved that games enhance learning and effective teaching process by shorting the time for group of students. Also, the results of the research by Anggoro et al., (2024), Ratnasari et al., (2023), Adipat et al., (2021), aiming to investigate the impact of game in students, confirmed that game based learning is more effective in the development of students' learning process. Cheng & Su, (2012) proposed a game-based learning system for improving student's learning effectiveness in system analysis course.

Procedia-Social and Behavioral Sciences. Zheng et al., (2024) state that games provide the possibility of incorporating children's challenges at simple to complex levels and, due to their nonlinear organization, place their users in different situations. They showed in their research that educational computer games are effective in increasing academic achievement and various dimensions of creativity in elementary school children. Mohammed et al., (2024) in a study to investigate the effectiveness of a computer game on addition of numbers in learning and memorizing first grade mathematics showed that students' learning and memorization through games was significantly better than the conventional teaching method.

Since computer game-based learning has been successfully used to improve mathematics scores of secondary school students (Huber et al., 2024), it has become a strategy in the curriculum to improve mathematics scores. As Liu et al., (2023) research showed that computer game-based learning increases learning and positive attitudes towards mathematics in elementary school students.

For the children there is no different between learning and gaming. They learn and enjoy with games which are designed based on educational and physical purposes. So taking role-playing games seriously and attach great importance to them. Understanding the role-playing effect on children's learning will help you prevent learning from becoming a big deal for them! Make learning simple and enjoyable for your child so that they are always eager to learn new things.

Games greatly enhance children's imagination and creativity and explore the world inside and around them. Group games help children get to know themselves and others well. This helps them communicate better in real society. These days, we live in the age of technology, and usually the best entertainment for children is computer games with mobile phones. There is an interesting point about these games. Video games can help your child focus. We know it's hard to believe, but these games aren't as bad or destructive as you might think. Many of them teach basic concepts like teamwork. In these types of games, a child learns leadership and guiding others well.

Getting children who are all about games interested in the learning and teaching environment is a challenge for elementary teachers. Educational games are an important part of the education process for students at this stage. Today, advances in science and technology have had an impact on teaching and learning methods. So that the results of technological innova-

tions have provided a new generation of educational tools to help students learn. Computer science and communications play an important role in today's society.

In fact, society in the 20th century has become increasingly computerized, requiring everyone to have computer knowledge and skills (Yanuarto & Susanti, 2023). Traditional learning approaches have undergone fundamental changes with the emergence of new technologies such as computer technology, and today, measures have been taken in most countries to use computer technology in educating students (Low et al., 2023). Especially students at lower levels, due to their objective thinking, need methods that are more objective. Computer education, by its nature, uses the student's two visual and auditory senses and makes the lesson diverse and entertaining for the student (Altawalbeh, 2024). It will be more effective if the acquisition of knowledge and skills is through media education. For example, when computer games are used in teaching, different skills develop in students that are not possible with traditional teaching (Videnovik et al., 2024). According to studies, in European schools, teachers use computer games for teaching.

Computer-aided learning programs are used in a conventional multimedia format, and computer-aided learning uses multiple senses simultaneously in the process of experience. Using a computer, the teacher can present his/her content in the form of multimedia including audio, video, and graphics to teach students. In this way, a learning environment can be created for different people with different characteristics (Yien et al., 2011). Research has shown that 75% of learning through visual and audio aids is done through the sense of sight, while only 13% of learning is done through the sense of hearing, 6% through the sense of touch, and 3% each through the sense of smell and taste. Therefore, today, computers as instructors in combination with traditional education are very important for educating and providing education for children with special needs. As a study by Anastasiadis et al., (2018) shows that multimedia education has been effective in increasing the level of learning, motivation, and participation of elementary school students with mental disabilities in mathematics lessons.

2. METHOD

Play provides the basis for children's development and plays a fundamental role in their lives. They express their needs and feelings in this way. Children enjoy playing, which helps them learn. Therefore, choosing appropriate activities with educational goals can respond to the child's spiritual, psychological, social, and physical needs. Hence, the value of play in meeting these needs is evident. Today, game-based educational programs have received special attention, and most preschool programs are based on this (Peirce, 2013). During play, the material to be learned is learned without pressure and with desire. For this reason, some educators believe that any subject matter should only be taught to children through play, and that it is generally better to transform formal elementary school lessons into creative and educational playtime (Sahlberg & Doyle, 2019).

The present study is one of the applied studies in which a quasi-experimental design with a pre-test-post-test design with a control group was used. The statistical population of this study is all students (girls and boys) who were studying in the primary school in the 2022-2023 academic year in Tashkent. Through available sampling, 40 of these students were se-

lected (mixed) and randomly placed in two experimental (20 students) and control (20 students) groups.

After obtaining the necessary permits and coordinating with the Department of Education, a list of students from 5 elementary schools in Tashkent's girls' and boys' primary schools was provided to this study, and it was coordinated by phone with the school principals that these children would be included in the study of the effect of games on learning.

After the final examination of the children for the absence of specific emotional-behavioral disorders such as attention deficit/hyperactivity disorder and other comorbid disorders, through interviews with their parents and teachers, the final sample consisted of 40 of these children, who were selected through a convenience method and, after obtaining the consent of the child and parents, were randomly assigned to two groups of 20: experimental and control. Then, the experimental group was exposed to the independent variable of game-based education for 8 weeks and two sessions (45 minutes) per week, but the control group did not receive any intervention.

The intervention was implemented in a group setting and the intervention environment was in schools that had the necessary facilities to carry out the designed exercises. Then, a post-test was administered to both groups. At all stages, teachers, children and their parents were assured that their information would remain completely confidential and would only be used for research purposes. After two months of identifying the students, implementing the educational program and completing the questionnaires, scoring and data analysis were performed.

According to Table 1, the frequency and percentage of gender distribution and age range of slow-learning students participating in the present study are presented separately in two experimental and control groups.

Table 1. Gender and age distribution of slow-learning students in two experimental and control groups

	Test		Control	
	Amount	Percent	Amount	Percent
Girl	12	60%	11	55%
Boy	8	40%	9	45%
7 years	4	20%	3	15%
8 years	6	30%	5	25%
9 years	6	30%	6	30%
10 years	4	20%	6	30%

3. RESULTS

Educational games and their impact on learning

Game-based learning is an exciting way to immerse students in academic learning experiences that can completely transform the educational experience with its countless benefits. Game-based learning is a new strategy and learning method for student engagement, allowing teachers to teach specific activities that can be used in the real world for students. Educational

gaming tools allow educators to monitor their students' performance and identify their strengths and weaknesses, making changes as needed. GBL is also a useful solution for transforming passive learners into active participants, preparing them to take control of their learning journey.

The engaging environment of games significantly increases understanding and retention of information by simplifying and making abstract or complex concepts easier to understand. This innovative learning method, with the engaging and interactive nature of games, not only teaches concepts and improves learning levels, but also motivates and develops students' skills.

As can be seen in Table 2, the t-statistic for learning course concepts in the post-test is (211.12), which is significant at the 0.001 level and indicates that there is a significant difference in learning between the two groups. The results of the analysis of covariance showed that the corrected mean squares of experimental group in learning (762.66) is significantly higher than the mean of the control group in this variable with a mean of (614.43). Therefore, it can be said that learning through games is effective in teaching course concepts to students.

Table 2. Results of univariate statistical analysis for the difference between experimental and control groups in effective students' game-based learning.

	Sum of squares	**DoF**	**Mean of squares**	**t-statistics**	**p-value**	**impact**
pretest	563.24	1	614.43	75.98	0.001	0.65
test	762.98	1	762.66	211.12	0.000	0.88
error	21.251	-	9.87	-	-	-

The results of this study regarding the research hypothesis on the effect of education through games on learning curricular concepts indicated that educational programs were effective on learning curricular concepts. These results are consistent with the research of De Freitas & Oliver, (2006) and Hwang et al., (2013) on games for students' learning progress and the research of Papastergiou (2009) on the effectiveness of education through educational programs on learning concepts. Therefore, according to what the researcher presented, designing computer educational programs using attractive images and animations and cheerful colors has a great impact on his learning. T

The research of Hosseini, Sahin et al., (2016) showed that computer games have a strong relationship with academic failure and academic motivation and a weak relationship with student learning, which was inconsistent with the results of this hypothesis. In fact, computer games in their research do not mean computer educational programs. If, instead of using computer games that do not have an educational purpose, computer educational programs are used to teach mathematical concepts to slow-learning students, we can see their progress in the lesson.

The results of the Trajkovik et al., (2015) study showed that through games, the basic educational goals in various topics can be achieved through indirect and direct education, and games lead to active and efficient learning in education. Games can not only include targeted

activities, but if the game is accompanied by a learning activity, the pleasure from the game is linked to the desired lesson and the child becomes interested in the lesson and the content.

The results of the study by Özdemir (2019) showed that educational games can play a significant role in improving the child's life by opening a new path in learning. Educational games play an active role in the development of creativity and lead to better and more experiences and better use of the mind in solving problems.

The results of the Ratnasari et al., (2023) study also showed that games are the most natural means of educating and learning a child. He learns through play, discovers new things, understands the properties of objects, imitates the behavior of adults, and learns about the world around him.

Advantages of the game method

- Game is an experiential form of learning. Students learn from what they do in the game.
- Game depicts part of reality.
- Game provides the opportunity to participate in the learning activity equally for all students.
- Game has motivational value
- Develops imagination and satisfies curiosity
- Fills free time
- Creates vitality and prepares the child for other activities

Disadvantages of the game method

- Cannot be implemented in crowded classes.
- Time-consuming
- Requires experienced and familiar teachers to implement this method

4. CONCLUSION

Playing in education is one of the successful interactive methods in learning for students and learners. Teaching and learning with play helps students learn the material practically and record it in their minds.

During learning, learners do not get bored due to the happy atmosphere and playing appropriate educational games. The interaction of students with each other helps in learning more and better and academic progress. The effect of play on a child's learning is undeniable. In the meantime, the important role of parents should not be forgotten. Educators and parents have a great influence on raising children.

You should make the conditions for your child's growth easier by gaining more awareness and turning learning into a pleasant process through play. Be careful that playing is not just with toys and physical objects!

In fact, one of the best things you can do for your child and his future learning is to play with him at home. Learn ideas for playing with your child at home and ensure your child's bright future.

The results of the relationship between play and learning and social development include the following:

- Children and students learn participation, cooperation, and teamwork.
- Children and students communicate more easily with the outside world. It helps to foster creativity and discover students' talents.
- Children and students learn how to support others and also express themselves.
- Educational games help to familiarize them with the principles and rules and understand the concept of competition.

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