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Research Article

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The Impact of Using Educational Games in the Living World Unit on Students' Academic Achievement and Motivation Towards Learning Science

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Abstract

This study aims to examine the impact of using different educational games on students' academic achievement and motivation towards learning science. To achieve this, the effect of teaching the "Living World" unit in the grade 5 science education curriculum with the addition of educational games on students' academic achievement and motivation was investigated. The study group consists of 25 students enrolled in the grade 5 at two village schools during the 2023-2024 academic year. The research was designed using a mixed-methods approach. Quantitative data were collected, a pre-test and post-test quasi-experimental design was employed. The quantitative data were collected using the "World of Livings Academic Achievement Test" and the "Motivation Scale for Learning Science" qualitative data were collected through an interview form. The analysis of the quantitative data was performed using the SPSS program and findings were compared using dependent and independent sample t-tests. For the qualitative data analysis, content analysis was applied. A significant difference in favor of the experimental group was found in terms of academic achievement and motivation as a result of using educational games. Additionally, educational games had positive effects on students' affective and cognitive traits, such as entertainment, excitement, lasting learning, and ease of understanding.

Key Words

Academic achievement • Educational games • Living world • Motivation • Science education

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Introduction

When examining the Science Education Curriculum published in 2018 (Ministry of National Education (MNE), 2018), it is clearly stated how science education should be implemented. The curriculum advocates for the use of student-centered practices in educational environments, such as problem-based learning, cooperative learning, project-based applications, and argumentation. It emphasizes the importance of students designing projects, creating models and products, and engaging in out-of-school learning environments to help them make the knowledge they acquire meaningful and permanent. One of the most significant features of the program is that students should be active participants, while teachers should act as guides (MNE, 2018).

The Türkiye Century Education Model (MNE, 2024), updated in 2024, is based on student-centered holistic education. It aims for students to become questioning, researching, and critical individuals, while also encouraging them to be active in group work through collaboration. To achieve this, various teaching methods should be employed in lessons. Since 5th grade students have a strong interest in games due to their age, educational games can be utilized in the classroom (Coşkun et al., 2012). Educational games, one of the methods and techniques used in science lessons, are known to play a crucial role in ensuring meaningful and permanent learning (Daniyarova et al., 2022). When designing educational games, it is essential to select games appropriate to the students' age level, understand the areas that need attention, and be aware of the advantages and disadvantages of the games (Adipat et al., 2021).

Educational games represent one of the most crucial methods employed in science education. Teachers plan educational games before teaching the topics. By guiding students, they ensure that the technique serves its intended purpose (Yıldırım et al., 2023). Educational games are a method in which connections between topics and concepts are established, learned information is repeated, and many skills are enhanced through enjoyment (Adipat et al., 2021). Educational games are a method that enables the repetition of information and helps children to reinforce the information they have learned (Demirel, 2020). These games provide a more relaxed environment for revisiting information, ensuring its retention, and assisting in teaching topics in a fun way (Hu & Razlog, 2023).

The most important feature of educational games, and what distinguishes them from regular games, is their ability to contribute to a child's development. When educational games support a child's mental, cognitive, and language development, they have served their purpose (Godwin-Jones, 2014; İnal & Korkmaz, 2019; Şenel & Akman, 2016). The use of educational games in lessons not only makes the lessons more enjoyable and fun but also enhances students' creativity (Anastasiadis et al., 2018). Playing games greatly contributes to a child's language development as well. While playing, children learn the names of living and non-living things around them, increasing their vocabulary. Additionally, they learn to communicate positively with the people around them (Alotaibi, 2024). Furthermore, through play, children learn to cooperate with their friends, build self-confidence, be tolerant, and make decisions (Pehlivan, 2016).

Educational games are effective in making difficult to understand topics more accessible. This helps create a more effective and productive learning environment, ensuring that the information learned is both enjoyable and lasting. Students who are usually reluctant to engage in lessons can participate more actively in lessons

(Karamustafaoğlu & Aksoy, 2020). Through play, individuals make connections between previously acquired knowledge and newly learned information. By integrating what they have learned with the game, they develop their imagination (Çakmak & Elibol, 2013). Additionally, through games, individuals acquire skills such as problem-solving, critical thinking, understanding events around them, making predictions, and drawing inferences related to those events (Chen et al., 2021).

Motivation is a significant driving force that encourages students to work hard and learn in order to succeed at school (Martin, 2001). In a study conducted by Ertem (2006), motivation—recognized as a key factor in student achievement—is generally defined as "an internal state that triggers and directs human behavior." Similarly, Düren (2000) describes motivation as the activation and mobilization of internal energy within individuals, directed toward specific goals. Considering that motivation is regarded as an essential component for success in science learning, it is important for educators aiming to motivate students or enhance their existing levels of motivation to identify the variables influencing motivation from the earliest stages of the educational process (Uzun & Keleş, 2010). One of the most critical factors affecting the success of the educational process is the method of learning used in the classroom (Yamarick, 2007). The most effective learning methods are those in which students are actively engaged and interact with one another.

Educational games help to concretize abstract concepts, ensuring that learning outcomes are achieved in a lasting manner (Nabdel et al., 2023). In this study, the aim is to use educational games in the "Living World" unit, which contains many abstract concepts, to make these concepts more concrete and to facilitate learning through fun. In this study, the selection of the "Living World" unit is based on the fact that students often have misconceptions related to this topic and face difficulties in understanding the concepts. Additionally, a review of the literature reveals that there are fewer studies conducted on the "Living World" unit compared to other units in the science curriculum. A search of the literature has not revealed any studies investigating the use of educational games to examine changes in students' academic achievement and motivation towards learning science in relation to the "Living World" unit. In this respect, the study is an original and powerful study. Based on this, the main research problem of this study is: Is there a significant difference in academic achievement and motivation towards learning science between the experimental group, where the science curriculum is applied together with educational games, and the control group, where only the science curriculum is implemented? Additionally, what are the views of the experimental group students regarding the use of educational games?

The following sub-problems have been identified for this research problem:

1. Is there a statistically significant difference in the academic achievement test scores between students in the experimental group and those in the control group?
2. Is there a statistically significant difference in the motivation towards learning science test scores between students in the experimental group and those in the control group?
3. What are the students’ opinions in the experimental group regarding the educational games used during the instruction?

Method

Research Design

In this study, an explanatory research design from mixed methods research was utilized. The explanatory design is composed of two stages: first, the collection and analysis of quantitative data, followed by the collection and analysis of qualitative data to explore these findings in greater detail (Büyüköztürk et al., 2008). Quantitative data were gathered using a quasi-experimental pretest-posttest control group design. Quasi-experimental design is a type of model in which the groups to be applied are randomly selected from the groups formed beforehand (Büyüköztürk et al., 2018). During the study, the lessons were conducted using the activities included in the science curriculum for the control group, while in the experimental group, in addition to the science curriculum, different educational games prepared by the researcher were used. Academic achievement and motivation tests were administered as pretests and posttests to all students before and after the experimental procedure. The experimental design implemented in the study is presented in Table 1.

Table 1

Experimental design for students in the experimental and control groups

Group	Pre-Test	Experimental Procedures	Post-Test
Experimental	World of Livings Academic Achievement Test Motivation Scale for Learning Science	Game-based learning + Teaching Based on the MEB Science Curriculum (2018) Textbook	World of Livings Academic Achievement Test Motivation Scale for Learning Science
Control	World of Livings Academic Achievement Test Motivation Scale for Learning Science	Teaching Based on the MEB Science Curriculum (2018) Textbook	World of Livings Academic Achievement Test Motivation Scale for Learning Science

Study Group

The study group consists of 25 students attending the 5th grade in two village schools in Aksaray province. One of the village schools forms the experimental group, while the other serves as the control group for comparison purposes. In both groups, the lessons were taught by the researcher. The study group data is presented in Table 2.

Table 2

Study group data

Group	Gender	f	%
Experimental	Female	8	66.7
	Male	4	33.3
Control	Female	6	46.2
	Male	7	58.8
Total	Female	14	56
	Male	11	44

Research Instruments and Processes

In the study, both quantitative and qualitative data collection tools were used to obtain the data. The quantitative data related to the Science course "Living World" unit was gathered using the "World of Livings Academic Achievement Test" (AAT) developed by Kasım (2020). The test consists of 26 multiple-choice questions. The Cronbach Alpha reliability coefficient of the test was calculated as 0.85. The motivation scale "Motivation Scale for Learning Science" (MSLS), developed by Dede & Yaman (2008), is composed of 23 items in a 5-point Likert format. The scale includes five factors: motivation for research, motivation for performance, motivation for communication, motivation for collaborative work, and motivation for participation. These five factors explain 47.16% of the variance in the total scale scores. The Cronbach Alpha reliability coefficients for the factors are as follows: motivation for research (0.75), motivation for performance (0.68), motivation for communication (0.56), motivation for collaborative work (0.55), and motivation for participation (0.59). The internal consistency reliability (Cronbach Alpha) for the entire scale is reported as 0.80. The reliability coefficient of the "World of Livings Academic Achievement Test" applied in this study was calculated as 0.96.

Qualitative data were collected using an "Interview Form" developed by the researcher. The interview form consists of nine open-ended questions. After the interview form was prepared by the researcher, feedback was gathered from three Science and two Turkish teachers, and necessary adjustments were made before the form was used. After thorough examination, no items were removed from the interview form.

The study was conducted with both the experimental and control groups over a total of 16 hours, with 4 hours per week for 4 weeks. For the control group, the "Living World" unit was taught using the teaching and question-answer methods in accordance with the objectives outlined in the grade 5 science education curriculum. The activities included in the science curriculum were implemented to complete the lessons.

In the control group, lessons were conducted in accordance with the learning outcomes of the "Living World" unit, as outlined in the 5th grade science textbook and science curriculum distributed by the Ministry of National Education. In the experimental group, however, lessons were conducted not only in line with the same textbook and curriculum but also incorporated educational games designed by the researcher, which complemented the learning outcomes of the "Living World" unit. Prior to the implementation, the games were introduced to the students in the experimental group, and the rules were thoroughly explained. Participation in the games was voluntary. Necessary reminders were provided during timed games to ensure proper engagement and adherence to the rules. After any unclear parts about the rules and games were clarified, the following games were played in sequence:

Game 1: "Which Group Am I In?" Game

Game 2: "Taboo" Game

Game 3: "Step-by-Step Living World" Game

Game 4: "Move Forward as Many Steps as the Question You Know" Game

The plan and implementation photographs of the game 'Which Group Am I In?' are provided in the appendix as a sample plan and photographs.

Data Analysis

The "World of Livings Academic Achievement Test" and the "Motivation Scale for Learning Science" were administered to both the experimental and control groups before and after the intervention. SPSS 22 software was used for the analysis of the quantitative data.

In the analysis of the quantitative data, a normality test was conducted on the data collected from both the experimental and control groups. Since the number of students in both groups was less than 30, the Shapiro-Wilk test was employed.

Table 3

Shapiro-Wilk Test results for the normality of AAT scores in the control group (pre-test–post-test)

Shapiro-Wilk		
Statistic	**df**	**p**
.951	26	.248

The results of the Shapiro-Wilk test for normality in the control group are presented in Table 3. Upon examination of the results ($p = .248 > .05$), it can be concluded that the data from the control group are normally distributed.

Table 4

Shapiro-Wilk test results for the normality of AAT Scores in the experimental group (pre-test–post-test)

Shapiro-Wilk		
Statistic	**df**	**p**
.934	24	.118

The results of the Shapiro-Wilk test for normality in the experimental group are presented in Table 4. Upon examination of the results ($p = .118 > .05$), it can be concluded that the data from the experimental group are normally distributed.

To compare the pretest and posttest scores between the experimental and control groups, an independent samples t-test was used. A paired samples t-test was employed to compare the pretest and posttest scores within the same group.

In the analysis of the qualitative data, content analysis was used. Content analysis is a method where the data collected related to the topic are examined to reach a conclusion (Tayade & Inzalkar, 2024). During the analysis of the qualitative data, the responses from the students were examined with the codes assigned to them (S1, S2, S3…) After the data were analyzed, the students' views on the lessons in which educational games were used were categorized and classified under specific themes.

In quantitative research, it is necessary to examine whether the data follows a normal distribution in order to use parametric tests (Çepni, 2007). In this study, it was also investigated whether the obtained data followed a normal distribution, and the findings are presented in Table 5 and Table 6.

Table 5

Findings of the groups for AAT (pre-test and post-test)

Test	Group	N	M	Sd	Kurtosis	Skewness
Pre-test	Experimental	12	12.83	2.791	-.721	.476
	Control	13	11.46	1.761	-1.325	.021
Post-test	Experimental	12	19.08	3.942	-.881	-.309
	Control	13	15.46	1.941	-1.074	-.295

Table 6

Findings of the groups for MSLS (pre-test and post-test)

Test	Group	N	M	Sd	Kurtosis	Skewness
Pre-test	Experimental	12	78.08	16.801	1.282	-.824
	Control	13	71.23	16.624	.027	-.490
Post-test	Experimental	12	91.17	13.06	-.641	-1.002
	Control	13	76.77	10.57	.745	.710

When examining Table 5 and Table 6, it can be observed that the findings follows a normal distribution. The kurtosis and skewness values falling between -1.96 and +1.96 serve as evidence of normal distribution (Ghasemi & Zahediasl, 2012). Since the obtained data exhibits normal distribution, the dependent and independent groups t-test was used in the quantitative data analysis.

Findings

Findings on the Effect of Educational Game Application on Academic Achievement

In order to determine whether there is a significant difference in the academic achievement test findings of the students in the experimental group in which educational games were used in addition to the science curriculum in teaching the "Living World" unit and the students in the control group in which only the current science curriculum was applied; the pre-test scores of students in the experimental group and those in the control group, the pre-test and post-test scores of students in the experimental group, the pre-test and post-test scores of students in the control group, the post-test scores of students in the experimental group and those in the control group were examined.

Table 7

Independent t-test findings for pre-test AAT scores of experimental and control group students

Group	N	M	Sd	df	t	p
Experimental Group Pre-test	12	12.83	2.79			
				23	1.482	.152
Control Group Pre-test	13	11.46	1.76			

The findings of the independent samples t-test revealed that there was no significant difference in the pre-test academic achievement scores between the experimental and control group students ($p > 0.05$; $t = 1.482$). When

examining the arithmetic means of the experimental and control groups, it was found that the mean for the experimental group students was M = 12.83, while the mean for the control group students was M = 11.46. This suggests that the students in both groups were similar in terms of equivalence.

Table 8

Dependent t-test findings for pre-test and post-test AAT scores of the experimental group

Group	N	M	Sd	df	t	p	d
Experimental Group Post-test	12	19.08	3.94				
				11	4.576	.001	1.83
Experimental Group Pre-test	12	12.83	2.79				

The findings of the paired samples t-test indicated a significant difference in the academic achievement scores between the pre-test and post-test for the experimental group students ($p < 0.05$; $t = 4.576$). When examining the arithmetic means, the pre-test academic achievement mean was M = 12.83, while the post-test academic achievement mean was M = 19.08.

Cohen (1988) classified effect sizes based on their significance. According to this classification, if $d \leq 0.2$, the effect size is considered small; if $0.2 < d < 0.8$, the effect size is considered medium; and if $d \geq 0.8$, the effect size is considered large. Based on the obtained findings, the effect size was determined to be 1.83. According to Cohen's (1988) effect size classification, this value represents a large effect.

Table 9

Dependent t-test findings for pre-test and post-test AAT scores of the control group

Group	N	M	Sd	df	t	p	d
Control Group Post-test	13	15.46	1.94				
				12	7.065	.000	2.16
Control Group Pre-test	13	11.46	1.76				

The findings of the paired samples t-test indicated a significant difference in the academic achievement scores between the pre-test and post-test for the control group students ($p < 0.05$; $t = 7.065$). The effect size was calculated to be 2.16, which, according to Cohen's (1988) effect size classification, represents a large effect.

Table 10

Independent t-test findings for post-test AAT scores of experimental and control group students

Group	N	M	Sd	df	t	p	d
Experimental Group Post-test	12	19.08	3.94				
				23	2.877	.011	1.17
Control Group Post-test	13	15.46	1.94				

The findings of the independent samples t-test revealed a significant difference in post-test academic achievement scores between the experimental and control groups, with the experimental group outperforming the control group ($p < 0.05$; $t = 2.877$). The mean scores for the experimental and control groups were M = 19.08 and M = 15.46, respectively.The effect size was calculated to be 1.17, which, according to effect size classification, represents a large effect.

Findings on the Effect of Educational Game Application on Motivation

In order to determine whether there is a significant difference in the motivation toward science learning test findings of the students in the experimental group in which educational games were used in addition to the science curriculum in teaching the "Living World" unit and the students in the control group in which only the current science curriculum was applied; the pre-test scores of students in the experimental group and those in the control group, the pre-test and post-test scores of students in the experimental group, the pre-test and post-test scores of students in the control group, the post-test scores of students in the experimental group and those in the control group were examined.

Table 11

Independent t-test findings for pre-test MSLS scores of experimental and control group students

Group	N	M	Sd	df	t	p
Experimental Group Pre-test	12	78.08	16.80			
				23	1.024	.316
Control Group Pre-test	13	71.23	16.62			

As a result of the independent samples t-test, no statistically significant difference was found between the experimental and control group students in terms of their pre-test scores on motivation toward science learning ($p > 0.05$; $t = 1.024$). When examining the arithmetic means of the experimental and control groups, it was found that the mean for the experimental group students was $M = 78.08$, while the mean for the control group students was $M = 71.23$. This suggests that the students in both groups were similar in terms of equivalence.

Table 12

Dependent t-test findings for pre-test and post-test MSLS scores of the experimental group

Group	N	M	Sd	df	t	p	d
Experimental Group Post-test	12	91.16	13.06				
				11	4.334	.001	0.87
Experimental Group Pre-test	12	78.08	16.80				

The findings of the paired samples t-test indicated a significant difference on motivation toward science learning scores between the pre-test and post-test for the experimental group students ($p < 0.05$; $t = 4.334$). When examining the arithmetic means, the pre-test motivation toward science learning mean was $M = 91.16$, while the post-test academic achievement mean was $M = 78.08$.

Cohen (1988) classified effect sizes based on their significance. According to this classification, if $d \leq 0.2$, the effect size is considered small; if $0.2 < d < 0.8$, the effect size is considered medium; and if $d \geq 0.8$, the effect size is considered large. Based on the obtained findings, the effect size was determined to be 0.87. According to Cohen's (1988) effect size classification, this value represents a large effect.

Table 13

Dependent t-test findings for pre-test and post-test MSLS scores of the control group

Group	N	M	Sd	df	t	p	d
Control Group Post-test	13	76.77	10.57				
				12	2.222	.046	0.52
Control Group Pre-test	13	71.23	16.62				

The findings of the paired samples t-test indicated a significant difference on motivation toward science learning scores between the pre-test and post-test for the control group students ($p < 0.05$; $t = 2.222$). The effect size was calculated to be 0.52, which, according to Cohen's (1988) effect size classification, represents a large effect.

Table 14

Independent t-test findings for post-test MSLS scores of experimental and control group students

Group	N	M	Sd	df	t	p	d
Experimental Group Post-test	12	91.16	13.06				
				23	3.041	.006	1.10
Control Group Post-test	13	76.77	10.57				

The findings of the independent samples t-test revealed a significant difference in post-test motivation toward science learning scores between the experimental and control groups, with the experimental group outperforming the control group ($p < 0.05$; $t = 3.041$). The mean scores for the experimental and control groups were $M = 91.16$ and $M = 76.77$, respectively.The effect size was calculated to be 1.10, which, according to effect size classification, represents a large effect.

Findings for the Interview Form

The qualitative findings obtained for the third sub-problem of the study were categorized into two categories: cognitive and affective. The codes were generated based on students' responses collected through an interview form and subsequently reviewed by multiple experts. Specifically, the coding process was carried out following the examination of students' responses by three science teachers and two Turkish teachers. The codes were determined through a consensus reached among these experts. There are multiple and different answers from the same participant and that they are numbered according to appropriate codes. The codes related to these categories are shown in Table 15.

Table 15

Student views on educational games

Category	Code	f	Student Expression
Cognitive	Easy Understanding	2	S1: "*I learned very easily while playing the game, this is a positive aspect.*" S5: "*I started to communicate better with my friends, and I learned the lesson very well.*"
	Facilitating Learning	3	S1: "*I learned very easily while playing the game, this is a positive aspect*." S2: "*Yes, I grasped it better. Because I listened to the lesson more attentively to succeed in group games with my friends*." S4: "*In other lessons, we sometimes write a lot, and I can't fully learn the topic, but in this lesson, I learned it more easily without writing anything*."
	Repetition	4	S1: "*Yes, we also played in other units, but we played more games on this topic. This helped me learn the topic better. I even reviewed the topic at home to win the games.*" S2: "*I learned this topic more permanently because I kept repeating it to win the games*." S4: "*I wish we played games in all topics. I kept repeating at home to win the games. Thus, I learned this topic more easily and beautifully*." S5: "*Since we played many games, I kept repeating, and I learned it more permanently*."
	Easy Recall	2	S1: "*Yes, I learned it more permanently, and I remember it better*." S4: "*This topic stayed more in my mind, I remember it better*."
	Permanent Learning	4	S1: "*Yes, I learned it more permanently, and I remember it better*." S2: "*I learned this topic more permanently because I kept repeating it to win the games*." S4: "*This topic stayed more in my mind, I remember it better*." S5: "*Since we played many games, I kept repeating, and I learned it more permanently*."
Affective	Fun	4	S1: "*Sometimes I get bored in other lessons, but I have a lot of fun in science lessons*." S3: "*I really liked this unit, it was so fun, and that's why I learned it better than other units*." S4: "*It was fun and helped me learn better*." S5: "*I had fun and learned at the same time, this became my favorite topic*."
	Making Happy	1	S2: "*Learning science through games is very exciting, it makes me very happy*."
	Excitement	2	S4: "*I got a little excited in timed games, but it was nice overall*." S5: "*I got a little excited in timed games, but I was very happy when I won*."
	Positive Communication	3	S2: "*It was great to play games with my group friends*." S3: "*Learning topics through games is very fun, and I also built better friendships with my friends.*" S5: "*I started to communicate better with my friends, and I learned the lesson very well.*"
	Motivation	2	S3: "*I really liked this unit, it was so fun, and that's why I learned it better than other units*." S5: "*I never got bored while the teacher taught this topic. I would like to play different games in all topics because lessons end very quickly with games*"
	Willingness to Learn	2	S4: "*I wish we played games in all topics. I kept repeating at home to win the games. Thus, I learned this topic more easily and beautifully*." S5: "*I never got bored while the teacher taught this topic. I would like to play different games in all topics because lessons end very quickly with games*"

Discussion, Conclusion & Suggestions

This research was conducted to examine the impact of using educational games in the grade 5 science lesson, specifically in the "Living World" unit, on students' academic achievements and motivation towards science learning. In the pre-test conducted before the intervention, no significant difference was found between the experimental and control groups in terms of academic achievement. However, the post-test findings revealed a significant difference in favor of the experimental group. In terms of motivation for learning science, both the experimental and control group students showed an increase. The increase observed in the experimental group was greater than that in the control group. The use of various educational games in science lessons was found to enhance students' motivation towards learning science. Therefore, according to the research findings, teaching the "Living World" unit using educational games led to an increase in students' academic achievements and motivation, and the interviews with the students supported this conclusion.

When reviewing the literature related to these findings, Şaşmaz & Erduran (2004) concluded in their study that the use of educational games in teaching the topic "The Solar System and Planets" increased students' academic achievements. Dumlu Güler (2011) found a significant increase in academic achievement in the experimental group of 6th grade students on the topic "Cells and Organelles" using educational game techniques, compared to the control group. Serdaroğlu & Güneş (2019) examined the effect of educational game use on both academic success and students' attitudes towards science in 6th grade students. The findings showed that the use of educational games increased students' academic success and fostered positive attitudes towards science. Tayfur (2019) studied the effect of educational games on 6th grade students' academic success and motivation in the unit on the systems of the human body. The study found that educational games improved both students' academic achievements and motivation. Demirezen & Öner Armağan (2024) concluded that the educational games developed for the digestive system topic increased students' motivation for the lesson. Furthermore, the study revealed that the use of educational games in teaching the digestive system topic enhanced students' retention of learning. Yıldız et al. (2016) examined the effect of using educational games in teaching the circulatory system on students' academic success and motivation. The study found a significant increase in academic achievement and motivation in the experimental group compared to the control group. Rouse (2013) found significant differences in favor of the experimental group, which examined the impact of educational game use on students' academic success and motivation. Akar İnce (2024), in her review of articles on the use of educational games in mathematics education, concluded that the use of educational games in lessons increased students' academic achievements and motivation.

When reviewing the literature, it has been observed that educational games not only increase students' academic success in science but also in various other subjects. Hanbaba & Bektaş (2011) investigated the impact of using educational games on students' academic success and attitudes toward the subject in 3rd grade life science classes. The study found no significant difference in students' attitudes, but there was a significant difference in academic success, with the experimental group outperforming the control group. Bakar et al. (2008) concluded in their study that the use of educational computer games in social studies classes motivated students towards the subject. Özata & Coşkuntuncel (2019), in his study examining the usability of educational games in mathematics lessons, conducted

interviews with pre-service science mathematic teachers and mathematic teachers working in Osmaniye. The findings of his study suggested that educational games should be used in mathematics lessons and that they could be effective in breaking students' prejudices towards the subject.

In the study, the findings regarding the opinions of the experimental group students on the educational games used in the teaching of the "Living World" unit in the Science lesson, in addition to the Science curriculum, are as follows:

It was found that the use of educational games in teaching the "Living World" unit in Science contributed to cognitive attributes such as ease of understanding, facilitation of learning, repetition, ease of recall, and long-term retention. Additionally, the use of these games was found to evoke affective characteristics, such as making students happy, entertaining them, motivating them, exciting them, and generating a desire to learn. Based on the feedback from students, it was determined that the majority expressed positive opinions about the use of educational games in lessons.

When examining studies on students' opinions about educational games, similar research has been encountered. Kılıçaslan (2023) investigated the impact of using educational games on students' academic achievement and awareness in the "DNA and Genetic Code" unit. He gathered students' opinions on educational games by asking them guiding questions. At the end of his study, students stated that educational games entertained them, were memorable and attention-grabbing, and helped reinforce the topic better. Çavuş & Balçın (2017) also gathered students' opinions about educational games. According to the feedback received, students expressed that educational games increased retention, facilitated learning, and should be used in other subjects as well.

It is believed that the use of educational games in other units and subjects, as in the "Living World" unit, will have a significant impact on increasing students' achievement and motivation. Therefore, when planning science instruction, the educational game method should be incorporated as much as possible. Additionally, this research was conducted with 5th-grade students, but educational games can be developed for different grade levels and subjects. By asking students to create their own games, their creative thinking skills can also be developed.

Ethic

Ethical approval was obtained from Necmettin Erbakan University, Social Sciences and Humanities Scientific Research Ethics Committee with protocol number of 2024/257.

Author Contributions

This article was written with the equal contributions of all authors.

Conflict of Interest

The authors declare no conflict of interest in the research.

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References

Adipat, S., Laksana, K., Busayanon, K., Asawasowan, A., & Adipat, B. (2021). Engaging students in the learning process with game-based learning: The fundamental concepts. *International Journal of Technology in Education (IJTE), 4*(3), 542-552. https://doi.org/10.46328/ijte.169

Akar İnce, Ş. N. (2024). *Matematik eğitiminde eğitsel oyun kullanımına yönelik çalışmaların ve eğitsel oyun türlerinin sistematik derleme yöntemi ile incelenmesi* [Systematic review of studies on the use of educational games in mathematics education and educational game types] (Master's thesis, Necmettin Erbakan University, Konya, Türkiye) Retrieved from https:// tez.yok.gov.tr/UlusalTezMerkezi/

Alotaibi, M. S. (2024) Game-based learning in early childhood education: a systematic review and meta-analysis. *Front. Psychol., 2*(15), 1307881. https://doi.org/10.3389/fpsyg.2024.1307881

Anastasiadis, T., Lampropoulos, G., & Siakas, K. (2018). Digital game-based learning and serious games in education. *International Journal of Advances in Scientific Research and Engineering (IJASRE), 4*(12), 139–144. https://doi.org/10.31695/IJASRE.2018.33016

Bakar, A., Tüzün, H., & Çağiltay, K. (2008). Öğrencilerin eğitsel bilgisayar oyunu kullanımına ilişkin görüşleri: sosyal bilgiler dersi örneği [Students' opinions of educational computer game utilization: a social studies course case] *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *35*(35), 27–37.

Büyüköztürk, Ş., Akgün, Ö., Karadeniz, Ş., Demirel, F., & Çakmak Kılıç, E. (2008). *Bilimsel araştırma yöntemleri* [Scientific research methods]. Pegem Publishing.

Büyüköztürk, Ş., Kılıç Çakmak, E., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2018). *Bilimsel araştırma yöntemleri* [Scientific research methods]. Pegem Publishing.

Chen, S-Y, Tsai, J-C, Liu, S-Y, Chang, C-Y. (2021). The effect of a scientific board game on improving creative problem solving skills. *Thinking Skills and Creativity*, *41*, 100921. https://doi.org/10.1016/j.tsc.2021.100921

Coşkun, H., Akarsu, B., & Kariper, İ. A. (2012). Bilim öyküleri içeren eğitsel oyunların fen ve teknoloji dersindeki öğrencilerin akademik başarılarına etkisi [The effects of educational games based on science stories on students' academic achievements in science and technology classroom]. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi (KEFAD), 13*(1), 93–109.

Çakmak, A., & Elibol, F. (2013). *Çocuk ve oyun* [Child and play]. Vize Publishing.

Çavuş, R., & Balçın, M. D. (2017). Fen bilimleri dersinde gerçekleştirilen oyun etkinliklerine ilişkin öğrenci görüşleri: maddenin yapısı ve özellikleri ünitesi örneği [Student opinions on game activities in the science course: a case of structure and properties of material unit]. *Researcher*, *5*(10), 323–341.

Çepni, S. (2007). *Araştırma ve proje çalışmalarına giriş* [Introduction to research and project studies]. Trabzon: Celepler Publishing.

Daniyarova, A., Suad, A., Vecherinina, E., Seluch, M., & Ananishnev, V. (2022). Games for science education: Is this technique effective for developing students' creativity and scientific competence?. *World Journal on Educational Technology*, *14*(1), 28-41. https://doi.org/10.18844/wjet.v14i1.6629

Dede, Y., & Yaman, S. (2008). Fen Öğrenmeye Yönelik Motivasyon Ölçeği: Geçerlik ve güvenirlik çalışması [A questionnaire for motivation toward science learning: a validity and reliability study]. *Necatibey Eğitim Fakültesi Elektronik Fen ve Matematik Eğitimi Dergisi, 2*(1), 19–37.

Demirel, Ö. (2020). *Eğitim sözlüğü* [Dictionary of education]. Ankara: Pegem Academy.

Demirezen , S., & Öner Armağan, F. (2024). Sindirim sistemi konusunda eğitsel oyun geliştirilmesi, uygulanması ve değerlendirilmesi [Development, implementation and evoluation of educational games about digestive system]. *Maarif Mektepleri Uluslararası Sosyal ve Beşeri Bilimler Dergisi, 7*(1), 13-36. https://doi.org/10.47155/mamusbbd.1479897

Dumlu Güler, T. (2011). *6. sınıf fen ve teknoloji dersindeki hücre ve organelleri' konusunun eğitsel oyun yöntemiyle öğretilmesinin öğrencilerin akademik başarisina etkisi* [The effect of teaching through educational game of cell and organelles topic in 6th grade science education course on academic achievement of students] (Master's thesis, Atatürk University, Erzurum, Türkiye) Retrieved from https:// tez.yok.gov.tr/UlusalTezMerkezi/

Düren, A. Z. (2000). *2000'li yıllarda yönetim* [Management in the 2000s]. 8th Edition, Alfa Basım Yayım Dağıtım, İstanbul, pp-338.

Ertem, H. (2006). *Ortaöğretim öğrencilerinin kimya derslerine yönelik güdülenme tür (içsel ve dışsal) ve düzeylerinin bazı değişkenler açısından incelenmesi* [Investigation of secondary education students' motivation types (intrinsic and extrinsinc) and levels towards chemistry course based on some variables] (Master's thesis, Balıkesir University, Balıkesir, Türkiye) Retrieved from https:// tez.yok.gov.tr/UlusalTezMerkezi/

Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism, 10*(2), 486-489. https://doi.org/10.5812/ijem.3505

Godwin-Jones, R. (2014). Games in language learning: Opportunities and challenges. *Language Learning & Technology*, *18*(2), 9–19.

Hanbaba, L., & Bektaş, M. (2016). Oyunla öğretim yönteminin hayat bilgisi dersi başarısı ve tutumuna etkisi [The effects of the teaching by games method on achievement and attitudes in the social studies course]. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*, *12*(1).

Hu, Z., & Razlog, R., (2023). The use of game-based learning to enhance student engagement in the acupuncture programme: South African students' opinions. *Journal for the Education of Gifted Young Scientists, 11*(2), 137-152. http://dx.doi.org/10.17478/jegys.1277401

İnal, M. & Korkmaz, Ö. (2019). Eğitsel oyunların öğrencilerin yabancı dil olarak Türkçe öğrenmeye dönük tutumlarına ve konuşma becerilerine etkisi [The effects of educational games on students' speaking skills and

attitudes towards learning Turkish as a foreign language]. *Journal of Mother Tongue Education (JOMTE), 7*(4), 898-913. https://doi.org/10.16916/aded.582203

Karamustafaoğlu, O., & Aksoy, S. (2020). "Canlıların sınıflandırılması" konusunda geliştirilen eğitsel oyunla ilgili öğretmen görüşleri [Teachers' views about the educational game developed on "classification of living things"]. *Academia Eğitim Araştırmaları Dergisi*, *5*(1), 90–109.

Kasım, F. (2020). *Canlılar dünyası ünitesinin öğretiminde tahmin-gözlem-açıklama ile desteklenmiş sınıf dışı eğitim etkinliklerinin öğrencilerin akademik başarılarına ve öğrenmenin kalıcılığına etkisi* [The effect of outdoor education activities supported by prediction-observation-explanation in the teaching of the living world unit on students' academic achievement and permanence of learning] (Master's thesis, Ondokuz Mayıs University, Samsun, Türkiye) Retrieved from https:// tez.yok.gov.tr/UlusalTezMerkezi/

Kılıçaslan, S. M. (2023). *Fen öğretiminde Mendel genetiği konusuna yönelik eğitsel oyun tasarımı ve değerlendirilmesi* [Educational game design and evaluation for Mendelian genetics in science teaching] (Master's thesis, Gazi University, Ankara, Türkiye) Retrieved from https:// tez.yok.gov.tr/UlusalTezMerkezi/

Martin, A. J. (2001). The student motivation scale: a tool for measuring and enhancing motivation. *Australian Journal of Guidance and Counselling*, *11*, 1-20.

MNE. (2018). Science curriculum (primary and secondary school grades 3, 4, 5, 6, 7 and 8).

MNE. (2024). The Türkiye Century Education Model 2024.

Nabdel, S., Aksoy, N. C. & Çinar, C. (2023). The relationship between academic achievement in mathematics course, academic procrastination, digital game playing motivation and problem-solving skill of middle school students. *Eğitim ve Toplum Araştırmaları Dergisi*, *10*(2), 224-236. https://doi.org/10.51725/etad.1383827

Özata, M., & Coşkuntuncel, O. (2019). Ortaokul matematik öğretmenlerinin matematik öğretiminde eğitsel matematik oyunlarının kullanımına ilişkin görüşleri [Opinions of secondary school mathematicsteachers on theuse of educational math games in mathematicsteaching]. *Mersin Üniversitesi Eğitim Fakültesi Dergisi*, *15*(3), 662-683. https://doi.org/10.17860/mersinefd.619983

Pehlivan, H. (2016). The role of play on development and learning [Oyunun gelişim ve öğrenmedeki rolü]. *Journal of Human Sciences, 13*(2), 3280–3292. https://doi.org/10.14687/jhs.v13i2.3767

Rouse, K. E. (2013). Gamification in science education: the relationship of educational games to motivation and achievement (Doctoral thesis, The University of Southern Mississippi, USA).

Serdaroğlu, C., & Güneş, M. H. (2019). 6. sınıf bitki ve hayvanlarda üreme, büyüme ve gelişme ünitesinin öğretiminde oyun temelli öğrenmenin akademik başarı ve tutum üzerine etkisi [Effects on academic achievement and attitude of game based learning in teaching of reproduction, growth and development unit in 6th grade plant and animal]. *Necatibey Faculty of Education Electronic Journal of Science and Mathematics Education*, *13*(2), 1015-1041. https://doi.org/10.17522/balikesirnef.570616

Şaşmaz Ören, F., & Erduran Avcı, D. (2004). Eğitimsel oyunla öğretimin fen bilgisi dersi "Güneş sistemi ve gezegenler" konusunda akademik başarı üzerine etkisi [The effect of educational game teaching on academic achievement in science education course in subject of "solar system and planats"]. *Ondokuz Mayıs Üniversitesi Eğitim Fakültesi Dergisi*, *18*, 67–76.

Şenel, M., & Akman, D. B. (2016). Fun teaching! Fun tech-ing! Interactive educational games for young learners. *Participatory Educational Research*, *3*(4), 12-21.

Tayade, P. S., & Inzalkar, S. M. (2024). Content analysis in communication research: methods and applications - A review. *AG Volumes*, 112–123. https://agvolumes.com/Books-AG/index.php/AGvolumes/article/view/30

Tayfur, A. (2019). *Oyun destekli değerlendirme sürecinin vücudumuzdaki sistemler ünitesinin öğretimine uygulanması* [Application of game supported assessment process on the teaching of 'the systems in our body' unit] (Master's thesis, Trabzon University, Trabzon, Türkiye) Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Uzun, N., & Keleş, Ö. (2010). Fen öğrenmeye yönelik motivasyonun bazı demografik özelliklere göre değerlendirilmesi [Evaluation of the motivation for science learning according to some demographic characteristics]. *Gazi Eğitim Fakültesi Dergisi*, *30*(2), 561-584.

Yamarik, S. (2007). Does cooperative learning improve student learning outcomes?. *The Journal of Economic Education*, *38*(3), 259-277.

Yıldırım, A., Sezer, D., & Ergin Yavaş, M. (2023). Okulda fen bilimleri dersinin öğretiminde eğitsel oyunların kullanılmasına yönelik sınıf öğretmenlerinin görüşleri [Opinions of classroom teachers on the use of educational games in teaching science lessons at school]. *Sosyal, Beşeri ve İdari Bilimler Dergisi, 6*(11), 1454-1471. https://doi.org/10.26677/tr1010.2023.1325

Yıldız, E., Şimşek, Ü., & Araz, H. (2016). Dolaşım sistemi konusunda eğitsel oyun yönteminin kullanılmasının öğrencilerin akademik başarı ve fen öğrenimi motivasyonu üzerine etkisi [The effect of the educational game method on academic achievement and motivation towards science learning in teaching of circulatory system]. *Mustafa Kemal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *13*(36), 20–32.

Appendix

<table>
<tr><td colspan="2">Grade</td><td>5</td></tr>
<tr><td colspan="2">Learning Area/Unit</td><td>5.2. Living World</td></tr>
<tr><td colspan="2">Sub-Learning Area/Topic</td><td>5.2.1. Let's Learn About Living Beings</td></tr>
<tr><td colspan="2">Learning Outcome</td><td>F.5.2.1.1. Classifies living beings based on their similarities and differences by giving examples.</td></tr>
<tr><td colspan="2">Suggested Duration</td><td>4 Hour</td></tr>
<tr><td colspan="2">Teaching-Learning Methods and Techniques</td><td>Educational Game - "Which Group Am I In?" game</td></tr>
<tr><td colspan="2">Educational Technologies, Tools, and Resources</td><td>Hula hoop, colored paper and pens, ball, dice</td></tr>
<tr><td rowspan="2">Teaching-Learning Activities</td><td>a) Attention Drawing
b) Motivation
c) Review
d) Transition to Lesson
e) Group Learning Activities
f) Individual Learning Activities</td><td>Which Group Am I In?

➢ The students are randomly divided into two groups.
➢ One student from each group competes in turns.
➢ There are five hula hoop rings in front of the students, each labeled with the name of a vertebrate animal group: Birds, Fish, Frogs, Reptiles, and Mammals.
➢ A small ball is given to each student to throw into the hoop.
➢ The teacher announces the characteristics of an animal group. The students are expected to find the correct answer and throw their ball into the corresponding hoop.
➢ If a student throws the ball outside the hoop or into the wrong hoop, they score zero points. If both students throw the ball into the correct hoop, the first student to throw wins the game. The winning student then comes to the teacher and rolls the dice.
➢ If 1 is rolled, the group earns 10 points, 2 is rolled, the group earns 20 points, 3 is rolled, the group earns 30 points, 4 is rolled, the group earns 40 points, 5 is rolled, the group earns 50 points, 6 is rolled, the group earns 60 points.
➢ For example, the teacher asks, “My body is covered with feathers. Guess which group I belong to?” and the students are expected to throw their ball into the "BIRDS" hoop. The winning student from that group comes to the teacher and rolls the dice, earning the corresponding points for their group.
➢ The group that reaches 500 points wins the game.</td></tr>
<tr><td colspan="2">Summary</td><td>The topic is summarized on a concept map.</td></tr>
<tr><td colspan="2">Assessment and Evaluation</td><td>The "Which Group Am I In?" game will also be used in the evaluation phase.</td></tr>
<tr><td colspan="2">Implementation Notes</td><td>Care will be taken to ensure proper timing.</td></tr>
</table>


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