



THE EFFECTS OF DIGITAL GAMES ON ACADEMIC ACHIEVEMENT: A COMPARATIVE META-ANALYSIS STUDY

OS EFEITOS DOS JOGOS DIGITAIS NO DESEMPENHO ACADÊMICO: UM ESTUDO DE META-ANÁLISE COMPARATIVA

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Abstract: Play is one of the most fundamental emotional and physical needs inherent in a child's nature. Games are important activities that contribute to an individual's physical, cognitive, emotional, and social development from an early age. They also help students to learn actively by doing and experiencing. Especially with the advancement of technology, game-based learning environments have been widely used in recent years, and by means of this method, designed according to the learner's needs, the permanence of education is ensured. In recent years, as educational and instructional methods have been increasingly diversified, it has become a necessity for teachers to make use of digital educational games in order to provide students with easy and effective instruction and to foster their development in every respect. This study will comparatively examine descriptive and experimental studies conducted between 2015 and 2025 in Turkey and worldwide on the effects of digital games on student achievement and present recommendations in line with the findings. For this purpose, articles and conference papers investigating the impact of digital games on academic achievement in Turkey and worldwide will be analyzed, and the results obtained will be compared. Each study included in this research will be subjected to content analysis. The dimensions included in the content analysis guideline will address each study in terms of its distribution by research method, subject area, sample, data collection tool, and generalized findings. Subsequently, based on the criteria identified in each study, the data will be coded and the frequency and percentage of repetitions of the relevant categories will be presented. In this context, studies conducted in Turkey and worldwide will be compared. The study will conclude with recommendations for future research, derived from the findings of the examined studies.

Keywords: Digital Game. Game-Based Learning. Child. Learning Environments. Education.

Resumo: Brincar é uma das necessidades emocionais e físicas mais fundamentais inerentes à natureza da criança. Jogos são atividades importantes que contribuem para o desenvolvimento físico, cognitivo, emocional e social do indivíduo desde a mais tenra idade. Eles também ajudam os alunos a aprender ativamente, fazendo e vivenciando. Especialmente com o avanço da tecnologia, ambientes de aprendizagem baseados em jogos têm sido amplamente utilizados nos últimos anos e, por meio desse método, projetado de acordo com as necessidades do aluno, a permanência da educação é garantida. Nos últimos anos, com a crescente diversificação dos métodos educacionais e instrucionais, tornou-se necessário que os professores utilizem jogos educacionais digitais para proporcionar aos alunos instruções fáceis e eficazes e promover seu desenvolvimento em todos os aspectos. Este estudo examinará comparativamente estudos descritivos e experimentais conduzidos entre 2015 e 2025 na Turquia e em todo o mundo sobre os efeitos dos jogos digitais no desempenho dos alunos e apresentará recomendações alinhadas aos resultados. Para tanto, serão analisados artigos e trabalhos de conferências que investigam o impacto dos jogos digitais no desempenho acadêmico na Turquia e no mundo, e os resultados obtidos serão comparados. Cada estudo incluído nesta pesquisa será submetido à análise de conteúdo. As dimensões incluídas na diretriz de análise de conteúdo abordarão cada estudo em termos de sua distribuição por método de pesquisa, área temática, amostra, instrumento de coleta de dados e resultados generalizados. Posteriormente, com base nos critérios identificados em cada estudo, os dados serão codificados e a frequência e a porcentagem de repetições das categorias relevantes serão apresentadas. Nesse contexto, estudos conduzidos na Turquia e em todo o mundo serão comparados. O estudo será concluído com recomendações para pesquisas futuras, derivadas dos resultados dos estudos examinados.

Palavras-chave: Jogo Digital. Aprendizagem Baseada em Jogos. Criança. Ambientes de Aprendizagem. Educação.

Introduction

In particular, the search for methods and techniques aimed at enhancing retention in education has brought to the fore various approaches that ensure students' active participation and increase their motivation. In this context, it can be stated that game-based instruction is currently employed in both formal and informal learning environments and has increasingly become a widely recognized teaching method. In recent years, game-based language teaching, a student-centered and active instructional method increasingly used in both first language and foreign language education, has become more widespread within the constructivist education model. Because games are an instructional method that entertains, relaxes, and delights students" (Kara, 2010, p. 409). Games are powerful tools that not only enable students to learn through experience but also enhance their problem-solving skills and foster active participation in the learning process. When games are integrated into the educational process, they contribute to the development of students' cognitive abilities and play a significant role in cultivating higher-order 21st-century skills such as social interaction, collaboration, creativity, and critical thinking. According to Gözler, Turan, and Turan (2020, p. 199), using games during formal education to teach lesson content can foster both academic achievement and social skill development in children. As Gezer (2023, p. 88) also emphasizes, educational games are directly related to 21st-century skills, particularly learning and renewal skills.

Recently, with the advancement of technology and the acceleration of digitalization, particularly after the pandemic, the methods and tools used in educational settings have significantly diversified. In this context, one of the most notable elements is digital games, which are employed for educational purposes and regarded as effective pedagogical materials. Digital games, due to their interactive nature, moves students from passive observers into active participants, enabling them to learn by experiencing information. Moreover, these games contribute to the development of students' 21st-century skills, such as problem-solving, critical thinking, and creativity. The learning opportunities provided by digital games, especially in the context of fostering 21st-century skills, also hold the potential to enhance the quality of educational programs. In their study, Göksel and Kobak reported that the game Roblox enhances students' skills in flexibility and adaptability, entrepreneurship and self-direction, productivity and responsibility, as well as social and intercultural competencies. Thanks to these advantages, digital games are gaining increasing importance in contemporary educational approaches and are considered among the innovative components of curricula in the 21st century.

When the literature is reviewed, it can be concluded that digital games increase learning motivation, positively influence students' attitudes toward lessons, and contribute to academic achievement, as reported in various studies. In particular, the widespread use of technology-based digital games has facilitated the development of more interactive and student-centered curricula. In his study, Mesut Öztürk similarly reported that applications such as Khan Academy sustain students' interest and enhance their motivation (Öztürk, 2025, p. 48). Today, digital games, regarded as a highly significant factor in students' educational lives, are seen as an important research area for examining their functionality in educational processes in all dimensions. The aim of this study is to present a comparative analysis of studies examined that the effects of digital games on students' academic achievement. Accordingly, this study reviews previous studies conducted in Turkey and worldwide in terms of their distribution over the years, methodology, subject area, sample, data collection tools, and findings. Similarities and differences among these studies are highlighted, and recommendations are provided for future research.

Methodology

Research Model

This study was conducted by using the meta-analysis method, which systematically brings together research examining the effects of digital games on students' academic achievement to

reach an overall conclusion. The meta-analysis method enables a holistic evaluation of findings from independent studies on the same topic, providing more reliable and generalizable results.

Study Materials

The study material consists of academic publications selected using a purposive sampling method. In this study, articles obtained using the keywords 'digital games' and 'academic achievement' were preferred. Publications directly related to the research topic, retrieved from the Google Scholar database, were included in the study. The study encompasses research conducted between 2015 and 2025.

Data Collection Tools

The Google Scholar database was used for data collection. Only studies directly examining the effects of digital games on academic achievement were included in this research. The time frame for selecting studies was set as 2015–2025, and research published during this period was reviewed. As a result of the screening, a total of 34 studies, 17 in Turkish and 17 in foreign languages, were included in the meta-analysis.

Data Analysis

The selected studies were analysed according to the established criteria, including their distribution over the years, research methodology, subject area, sample, data collection tools, and findings. During this process, data from the studies were systematically coded, and a comparative analysis was conducted to reveal overall trends regarding the effects of digital games on academic achievement.

Results and Discussion

Findings regarding the publication years of 34 national and international studies conducted between 2015 and 2025 that met the inclusion criteria of the research.

Table 1. *Distribution of Studies by Year in Turkey and Worldwide*

Studies Conducted in Turkey	f	Studies Conducted Worldwide	f
2015	-	2015	2
2016	-	2016	-
2017	1	2017	3
2018	-	2018	-
2019	3	2019	-
2020	-	2020	3
2021	-	2021	-
2022	4	2022	2
2023	2	2023	2
2024	6	2024	3
2025	1	2025	2

Source: authors results

Examining the distribution of studies conducted in Turkey by year, Table 1 shows that there were 6 studies in 2024, 4 in 2022, 3 in 2019, 2 in 2023, and 1 each in 2017 and 2025. No studies on this topic were identified for 2015, 2016, 2020, and 2021. The distribution of worldwide studies by year indicates that 3 studies were conducted in 2017, 2020, and 2024, while 2 studies were conducted in 2015, 2022, 2023, and 2025. No studies were found for 2016, 2018, 2019, and 2021.

Table 2. Distribution of Studies by Subject Area in Turkey and Worldwide

Studies Conducted in Turkey	f	Studies Conducted Worldwide	f
Science	6	Science	2
Social Studies	2	Social Studies	1
Mathematics	4	Mathematics	4
Turkish	2	Turkish	1
English	2	English	4
General	1	General	5

Source: authors results

Regarding the distribution of studies conducted in Turkey by subject area, shown in Table 2, 6 studies were identified in science education, 4 in Mathematics education, 2 each in Turkish and English education, and 1 in General subjects. For worldwide studies, the distribution shows 5 studies in General subjects, 4 each in English and Mathematics, 2 in science education, and 1 each in Chinese and Social Studies education.

Table 3. Distribution of Studies by Research Method in Turkey and Worldwide

Studies Conducted in Turkey	f	Studies Conducted Worldwide	f
Mixed Method	7	Mixed Method	4
Quantitative Method	8	Quantitative Method	10
Qualitative Method	2	Qualitative Method	3

Source: authors results

Examining the frequencies of research methods for studies conducted in Turkey, Table 3 shows that found that 7 used the mixed method, 8 used the quantitative method, and 2 used the qualitative method. For worldwide studies, 10 employed the quantitative method, 4 used the mixed method, and 3 used the qualitative method.

Table 4. Distribution of Studies by Sample in Turkey and Worldwide

Studies Conducted in Turkey	f	Studies Conducted Worldwide	f
Primary School	5	Primary School	5
Secondary School	8	Secondary School	1
High School	-	High School	1
Undergraduate	1	Undergraduate	8
Graduate	1	Graduate	-
Article	2	Article	2

Source: authors results

Based on the findings of Table 4, examining the distribution of studies conducted in Turkey by educational level, 8 studies were conducted at the secondary education level, 5 at the primary education level, and 1 study each at the undergraduate and graduate levels. No studies were identified at the high school level. For worldwide studies, the distribution by educational level shows 8 studies at the undergraduate level, 5 at the primary school level (2 of which were articles),

and 1 study each for middle school and high school levels. No studies were found at the graduate level.

Table 5. *Distribution of Studies by Data Collection Tools in Turkey and Worldwide*

Studies Conducted in Turkey	f	Studies Conducted Worldwide	f
Motivation Scale	5	Motivation Scale	3
Academic Achievement Test	15	Academic Achievement Test	9
Anxiety Scale	1	Anxiety Scale	-
Attitude Scale	4	Attitude Scale	1
Observation Form	1	Observation Form	2
Knowledge Form	3	Knowledge Form	10
TR Dizin, YÖK Thesis Center, Google Scholar, Sobiad, Turkish Education Index, ASOS Index	2	PSYC, INFO, Web of Science, ERIC, Proquest.	2
Interview Form	5	Interview Form	7
Diaries	1	Diaries	-
		Document Analysis	1

Source: authors results

Based on the findings of Table 5, examining the distribution of studies conducted in Turkey by data collection tools, 15 studies used an academic achievement test, 5 used a motivation scale or interviews, 4 used an attitude scale, 3 used a knowledge form, 2 used a database, and 1 study each used an anxiety scale, observation form, or diaries. For worldwide studies, 10 studies used a knowledge form, 9 an academic achievement test, 7 an interview form, 3 a motivation scale, 2 a database or observation form, and 1 study each used an attitude scale or document analysis.

Table 6. *Distribution of Digital Games Used in Studies Conducted in Turkey and Worldwide*

Studies Conducted in Turkey	f	Studies Conducted Worldwide	f
Animation	2	Puzzle	3
Video	2	Animation/Role-Play	2
Virtual Museum	1	Classification	1
Google Earth	1	Competitive Gamification Dynamics	2
Where Am I?	1	Canvas	1
Wordwall	3	Clascraft	2
Kahoot	1		
H5P	1		
Derived Word Hunt	1		
Who Wants to Be a Millionaire?	1		

Source: authors results

Based on the findings of Table 6, examining the distribution of digital games used in studies conducted in Turkey, 3 studies employed Wordwall, 2 used animation and video, and 1 study each used Virtual Museum, Google Earth, Where Am I, Kahoot, H5P, Derived Word Hunt, and Who Wants to Be a Millionaire? For worldwide studies, 3 studies used Puzzle, 2 used Animation/Role-Play, Competitive Gamification Dynamics, and Classcraft, and 1 study each used Classification and Canvas.

Findings of Studies Conducted in Turkey: It was found that digital games increase students' academic achievement. (6) It was found that digital games not only enhance academic achievement but also increase students' motivation toward the lesson. (4) It was found that digital games increased academic achievement, but no changes were observed in students' attitudes. (2) It was

found that learning through educational digital games is more permanent compared to learning through educational games. (2) It was found that educational games are more effective than digital games. (1) It was found that digital games increase students' academic achievement and have a positive effect on their attitudes toward the lesson. (1) It was found that teaching with educational digital games does not have an effect on students' academic achievement. (1)

Findings of Studies Conducted Worldwide; It was found that digital games increase students' academic achievement. (6) It was found that digital games not only enhance academic achievement but also increase students' motivation toward the lesson. (10) It was found that digital games increase students' academic achievement and positively affect their attitudes toward the lesson. (1).

Conclusion

In this study, research on the use of digital games in education conducted in Turkey and worldwide was examined using the meta-analysis method. According to the findings, the distribution of studies over the years shows focus on certain periods. In Turkey, the highest number of studies was conducted in 2024, while in worldwide, increases were observed in 2017, 2020, and 2024. Conversely, the absence of studies on this topic in certain years at both levels indicates periodic fluctuations in interest within the research field. Examining the distribution of subject areas, studies in Turkey were predominantly conducted in Science and Mathematics education, whereas worldwide, there was a focus on more general studies as well as studies in English and Mathematics education. This suggests that the educational priorities and research trends may differ across countries.

From the methodological perspective, mixed and quantitative methods were predominantly preferred in Turkey, whereas quantitative methods were particularly favored worldwide. The limited use of qualitative methods in both contexts indicates a need for more in-depth investigation in this field. Examining the distribution by educational level, studies in Turkey were primarily concentrated at the secondary education level, while in the worldwide the undergraduate level was most prominent.

The research findings provide strong evidence that digital games enhance students' academic achievement both in Turkey and worldwide. Additionally, there are frequent reports indicating that digital games positively contribute to student motivation. However, some studies have found that digital games do not significantly affect academic achievement, or although they contribute to achievement, they do not produce meaningful changes in students' attitudes.

The fact that the impact of educational digital games differs from the traditional educational games indicates that the type of game and the context of the implementation may be important variables influencing learning outcomes.

Overall, it can be stated that digital games are effective in enhancing academic achievement and motivation in educational processes; however, they may yield varying results regarding learning attitudes and long-term permanence.

This indicates that digital games should not be considered in isolation but rather in conjunction with pedagogical design and the context of implementation.

In line with the research findings, the following recommendations can be made regarding the use of digital games in education:

It has been observed that qualitative research is limited both in Turkey and worldwide. Therefore, placing greater emphasis on qualitative studies that can provide in-depth data will allow for a more comprehensive understanding of the effects of digital games on learning processes. Since the studies in Turkey are concentrated at the secondary education level and at the undergraduate level internationally, more research is needed focusing on early age groups such as primary and preschool education. This would enable a comparative evaluation of the effects of digital games on learning from a developmental perspective. In Turkey, it is also recommended to expand research into different disciplines such as science and English education, so that the potential of digital games in various learning domains can be identified. Furthermore, most of the existing studies are based

on short-term implementations. However, there is also a need for research that examines the long-term effects of digital game-based learning on academic achievement, motivation, and attitudes.

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