International Journal of Innovative Research and Scientific Studies, 8(1) 2025, pages: 1421-1428

IJIRSS
International Journal of Innovative Research & Scientific Studies

**ISSN:** 2617-6548

URL: www.ijirss.com

# The impact of using the digital educational games blog on enhancing mathematical concepts among sixth-grade students in Jordan

Sabah Jamil Al-Nawaiseh

*Department of Educational Technology, Faculty of Arts and Educational Sciences, Middle East University, Amman, Jordan.*

(*Email: snawaisseh@meu.edu.jo*)

## Abstract

This study aimed to investigate the impact of using the educational games blog on developing mathematical concepts among sixth-grade students in Jordan. To conduct the research experiment, the researcher followed a quasi-experimental design with pre-tests and post-tests for two experimental and control groups. The study included 50 intentionally selected students from the third grade, distributed into two groups: Group A represented the experimental group consisting of 25 students who were taught using the digital educational games blog, while Group B represented the control group consisting of 25 students taught using conventional methods. The study tool was a test for acquiring mathematical concepts, and its validity and reliability were ensured. The results showed a statistically significant impact on the acquisition of mathematical concepts test in favor of the experimental group ($F = 8.13$, $p = 0.00$, $\eta^2 = 0.39$), indicating that the teaching method using the digital educational games blog was more effective than traditional methods, which was attributed to the teaching method using the educational digital game. Based on the results, by integrating these games into the curriculum, students can be motivated to learn innovatively, improving their academic performance. The study recommends using digital educational games in the educational learning process, especially in mathematics, due to their clear positive impact on acquiring and understanding mathematical concepts among sixth-grade students.

**Keywords:** Blog, Digital educational games, Mathematical concepts.

**DOI:** 10.53894/ijirss.v8i1.4666
**Funding:** This research is supported by the Middle East University, Amman, Jordan.
**History: Received:** 24 December 2024/**Revised:** 31 January 2025/**Accepted:** 7 February 2025/**Published:** 14 February 2025

**Competing Interests:** The author declares that there are no conflicts of interests regarding the publication of this paper.
**Transparency:** The author confirms that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
**Publisher:** Innovative Research Publishing

## 1. Introduction

Digital educational games, facilitated by technological advancements, are a popular recreational activity that helps students learn and develop technical skills [1]. These games have become an important part of student culture, and companies are taking advantage of this trend to develop games that assist with study materials and mathematical concepts in an enjoyable manner [2]. Digital educational games simplify mathematics and enhance students' motivation, thereby improving their understanding of mathematical concepts [3].

Technologic Blog is a free educational platform that offers interactive games to engage students in learning, provides innovative resources for teachers, and facilitates the preparation of calculations and downloading games, making learning more appealing and effective, especially in exploring mathematical concepts [4]. Digital educational games enhance students' understanding of mathematical concepts and raise their academic achievement, making education more interactive [5].

Digital educational games have emerged as an innovative tool in education, offering an interactive and engaging learning experience compared to traditional methods. They help create an interactive learning environment [6, 7]. Digital games are defined as a learning process based on planned steps for students' performance on advanced devices. Othman [8], digital games are described as interactive exercises powered by technology, which make learning enjoyable and stimulate participation.

Digital educational games help students learn complex concepts and enhance skills such as collaboration, analytical thinking, and problem-solving [5]. It also promotes stimulating thinking, improves academic achievement, and contributes to the sharing of knowledge among students [9]. These games create an interactive environment that encourages participation and provides quick feedback, prompting students to enhance their learning practices [10]. In addition to enhancing students' emotional experiences through a sense of accomplishment and self-confidence [11].

To choose effective digital learning games, technical and educational requirements must be taken into account to ensure that they integrate with traditional teaching methods and provide age-appropriate content [12]. Games should also feature clear learning objectives, easy grammar, and content appropriate to the learner's growth, with visual and auditory effects used to enhance learning. In addition, immediate feedback should be provided to increase motivation and contain elements of suspense and reinforcement to ensure continuity of learning and motivate students to progress [11, 13].

Technology's blog offers no-cost and budget-friendly learning tools, including downloadable game templates and activities such as PowerPoint and Excel games, making learning more interactive and engaging. The blog is globally recognized for its role in facilitating the design of fun and educational activities, with annual subscriptions supporting homeschooling to scale up activities [14].

Mathematical concepts are the foundation for building mathematics curricula, where the building blocks of knowledge and understanding are key educational goals [15]. According to [16], mathematical concepts are the foundation of understanding mathematics and problem-solving. Learning them in the basic stages also requires fundamental mathematical skills [17]. Mathematical concepts are defined as the mental image formed from the generalization of the characteristics common to examples [17].

Mathematical concepts are essential in curriculum design and enhance students' scientific thinking, as they help simplify and organize the surrounding environment [18]. These concepts also promote critical thinking, which helps develop analytical and measurement skills [19]. It also contributes to the development of students' creativity, encouraging them to think innovatively and develop new solutions to mathematical problems [20].

Mathematical concepts require basic criteria to be effective, such as being easily understandable terms or symbols and being an abstraction of common properties between facts for widespread application, making them a powerful tool in analysis and problem-solving [21]. Learner-centered objectives and research in mathematics education have also contributed to the development of the National Council of Teachers of Mathematics standards, which include curriculum content, learners' activities, and real-life examples to illustrate concepts [1].

Mental concepts in mathematics are challenging for students because they are difficult to understand and relate to reality, making traditional methods inadequate. Therefore, modern educational trends call for activating the student's role in learning by using technology and digital educational games to make learning more enjoyable and interactive [22].

Conferences such as the Digital Education and Innovation Conference call for the integration of new technologies in mathematics education, focusing on the use of innovative tools like interactive whiteboards and digital educational games to enhance math and science learning [23]. The eighth conference "Teaching and Learning Mathematics in the Light of Global Changes," held in El-belkasy and Wahieb [24], presented the latest technical trends and innovations in mathematics education, with a focus on e-learning and distance education through experiments and research aimed at addressing challenges and shaping a new future for learning mathematics based on global experiences and local practices.

Despite the benefits of digital educational games in improving students' achievement in mathematics, previous studies have not sufficiently discussed their effective integration into the curriculum or their impact on mathematical concepts at different stages of education. In recent years, TIMSS exam results have revealed a marked decline in Jordanian students' performance in mathematics, highlighting a growing concern about the effectiveness of current teaching methods. These outcomes prompt questions regarding the ability of traditional curricula to meet students' needs and enhance their understanding of mathematical concepts [4]. An innovative learning experience using digital educational games is designed to improve mathematical concepts for sixth graders in Jordan, focusing on their impact on motivating students and enhancing their understanding of mathematical concepts through case studies in diverse learning environments.

To achieve this goal, the researcher aims to answer the following question:

Is there a statistically significant difference at the level of significance ($\alpha \leq 0.05$) between the average scores of sixth-grade students on the achievement test for enhancing mathematical concepts attributed to the teaching methods (control, experimental)?

## 2. Literature Review

Recent studies have shown the effectiveness of digital educational games in improving students' skills in various subjects. In the study by Majeed and Khazal [20], students who used digital games excelled in remembering and analyzing skills compared to students who studied traditionally. The study by Al-Harran [6] also showed the positive impact of digital games

in improving the teaching of social studies for seventh-grade students in Kuwait. In the study by White and McCoy [25], fifth-graders' math attitudes and outcomes improved after using games. Fokides [26] confirmed that students who used digital games to learn mathematics outperformed their counterparts who studied the traditional way.

Nadolny, et al. [22] explained the importance of clarity in learning objectives and ease of grammar in educational games to suit the learner's level, with the use of visual and auditory effects and immediate feedback to enhance interaction and motivation. Games should include suspense and reinforcement to motivate the learner to continue and progress [27].

Despite extensive research on the role of digital educational games in improving student achievement in mathematics, the majority of studies lack critical analysis of how to effectively integrate these games into the curriculum.

In a study by Al-Otaibi and Al-Malki [1], it was emphasized that educational games contribute to improving students' technical skills, but this study did not discuss in depth how this improvement can be achieved within traditional educational frameworks or whether digital games can replace or support traditional methods of teaching. Many studies, such as those by Ibn Saqr and Abd al-Maqsoud [2], have focused only on the positive outcomes of these games without considering the challenges or limitations associated with their use in diverse educational environments.

Some studies, like Jalloul [3], have shown the effect of gaming in improving academic achievement and motivation, but they focused on Western learning environments and did not take into account cultural differences in local environments such as Jordanian schools. The impact of games on students' emotional understanding and boosting self-confidence and a sense of accomplishment was also not emphasized. Therefore, there is a need to explore the effective integration of digital educational games into the curriculum while taking into account local cultural and social characteristics and their emotional impacts.

This study will address gaps by designing an innovative learning experience that integrates digital games into the sixth-grade curriculum in Jordan while measuring their impact on students' motivation and understanding of mathematical concepts, taking into account cultural and contextual differences and assessing their emotional impacts on students' learning experiences.

## 3. Methodology

### *3.1. Research Design*

The study methodology used the quasi-experimental approach because it is appropriate to achieve the objective of the study regarding the impact of using the digital educational games blog (T.B) on enhancing mathematical concepts among sixth-grade students in Jordan. The quasi-experimental design was used for two equivalent groups. Figure 1 illustrates the quasi-experimental design employed.

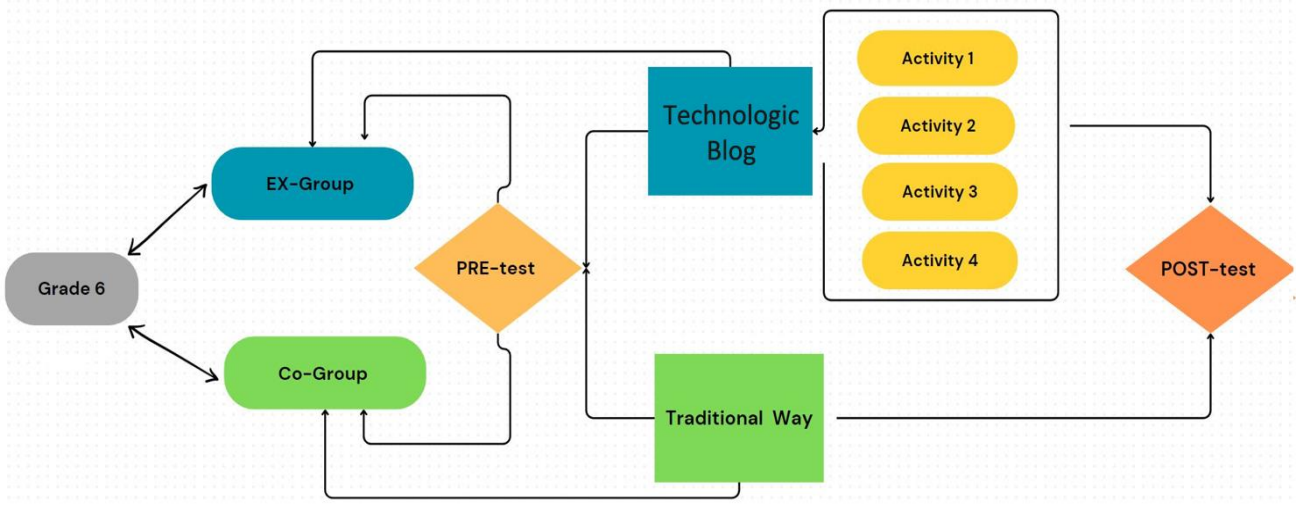


**Figure 1.**
Quasi-experimental design.

### *3.2. Participants*

The study participants were purposefully selected from sixth-grade students during the second semester of the year (2023-2024), totaling 50 students at the International Independent Schools in Jordan. This group consisted of 25 students in the experimental group and 25 students in the control group. This type of sampling was used due to the logistics required to conduct the study effectively.

### *3.3. Data Collection*

To verify the validity of the test, it was presented to a group of conciliators who refereed it, expressed their opinions, and verified the validity of its questions and their suitability for the level of learners. In light of the views of the arbitrators, the test was adopted in its final form, which consists of 20 arithmetic problems, with a total score of 20, assigning one point for each question.

The reliability of the test, to ensure its stability, was verified by calculating the reliability coefficient using the method of internal consistency according to the Kuder-Richardson 20 equation, which yielded a value of 0.8410. This value was considered appropriate for the purposes of this study. The responses of a group outside the study sample, consisting of 22

students, were analyzed using the SPSS program to calculate the coefficients of difficulty and discrimination for the test items. Table 1 shows the Discrimination and Difficulty Index of the Math Concept Test.

**Table 1.**
Demographic discrimination and difficulty index of the math concept test.

| Item number | Difficulty index | Discrimination index | Item number | Difficulty index | Discrimination index |
|---|---|---|---|---|---|
| 1 | 0.31 | 0.69 | 11 | 0.51 | 0.32 |
| 2 | 0.33 | 0.46 | 12 | 0.34 | 0.65 |
| 3 | 0.45 | 0.49 | 13 | 0.34 | 0.56 |
| 4 | 0.44 | 0.48 | 14 | 0.56 | 0.45 |
| 5 | 0.46 | 0.53 | 15 | 0.51 | 0.82 |
| 6 | 0.46 | 0.66 | 16 | 0.45 | 0.65 |
| 7 | 0.53 | 0.56 | 17 | 0.37 | 0.58 |
| 8 | 0.33 | 0.57 | 18 | 0.29 | 0.46 |
| 9 | 0.37 | 0.72 | 19 | 0.29 | 0.78 |
| 10 | 0.34 | 0.33 | 20 | 0.44 | 0.40 |

It is noted from Table 1 that the difficulty coefficients of the questions ranged between (0.29 – 0.56), and the discrimination coefficients ranged between (0.32 – 0.82). They are acceptable for scientific research purposes.

### *3.4. Data Analysis*

Statistical treatment ensured the stability of the study instrument (mathematical concept test) by calculating the internal consistency reliability coefficient for the mathematical concept development test using the Kuder-Richardson 20 reliability coefficient (KR-20). The t-test was used for two independent samples (Independent Sample t-test) to verify the equivalence of the two groups in the pre-application of the mathematical concept development test. The values of arithmetic averages and standard deviations of the pre- and post-application were calculated. To answer the study question, the one-way ANCOVA test was used, and the value of Eta Squared ($\eta^2$) was calculated to determine the size of the effect of using the digital educational games (T.B) Blog in developing mathematical concepts among sixth-grade students in Jordan.

## 4. Results

The results of this study are outlined below:

### *4.1. Normality of the Distribution*

To verify the equivalence of groups, the arithmetic averages and standard deviations of the scores of the study sample were extracted from the test for the development of mathematical concepts in mathematics before, according to the group variable (experimental, control). To indicate the statistical differences between the arithmetic averages, the "T" test was used, and Table 2 illustrates this.

**Table 2.**
T-test results for two independent samples of the performance of the experimental and control group students on the pretest.

| | Group | N | Mean | Std.dev | t-value | D.F | Sig |
|---|---|---|---|---|---|---|---|
| Mathematical concepts test | Experimental | 25 | 14.0 | 3.06 | -4.91 | 48 | 0.237 |
| | Control | 25 | 10.2 | 2.36 | | | |

**Note:** No statistically significant differences at ($\alpha \leq 0.05$).

Table 2 shows that there were no statistically significant differences ($\alpha \leq 0.05$) attributed to the group in the pre-mathematical concept development test, based on the value of T, which was -4.906, and a statistically significant value of 0.237. This result indicates the equivalence of the groups.

### *4.2. Results Related to the Study Question*

The results related to the study's hypothesis state: "There is no statistically significant difference at the level of significance ($\alpha = 0.05$) between the averages of the grades of the sixth-grade students on the test of the development of mathematical concepts, attributed to the teaching method (control, experimental)."

To verify the validity of the hypothesis of the study, the arithmetic averages and standard deviations of the grades of the basic stage students in Jordan were calculated for the mathematical concepts test in the pre- and post-measurements according to the teaching strategy using the digital educational games Blog (T.B) versus the usual method. The differences between the two groups were examined, and Table 3 illustrates this.

**Table 3.**
Means and standard deviations of sixth-grade students' pretest and posttest math concept tests.

| Method | N | Pre-test | | Post-test | |
|---|---|---|---|---|---|
| | | Mean | Std.dev | Mean | Std.dev |
| Digital educational games | 25 | 14 | 3.06 | 16.68 | 0.325 |
| Traditional | 25 | 10.2 | 2.36 | 14.64 | 0.373 |

It is clear from Table 3 that there are apparent differences between the arithmetic averages of students' scores on the mathematical concepts test as a whole in the pre- and post-measurements according to the teaching strategy using the digital educational games blog versus the usual method.

To determine whether these apparent differences are statistically significant, a one-way analysis of variance was used for telemetry to test mathematical concepts as a whole according to the teaching strategy using digital educational games (T.B) Blog, versus the usual method after neutralizing the effect of their pre-measurement. Table 4 illustrates this.

**Table 4.**
Results of an ANCOVA of sixth-grade students' post-test.

| Source of variation | Sum square | Df | Mean square | F | sig | $\eta^2$ |
|---|---|---|---|---|---|---|
| Pre-test | 2.31 | 1 | 2.31 | 0.747 | 0.39 | |
| Teaching method | 25.09 | 1 | 25.09 | 8.13 | *0.00 | 0.69 |
| Error | 144.89 | 47 | 3.08 | | | |
| Adjusted total | 199.22 | 50 | | | | |

**Note:** *Statistically significant at the level ($\alpha \leq 0.05$).

The ANCOVA results indicate statistically significant differences (Sig. = 0.000) in students' scores on the post-test of mathematical concepts attributed to the teaching method. These findings suggest that the teaching strategy involving digital educational games was effective. It is clear from Table 4 that there are statistically significant differences at the level of significance ($\alpha \leq 0.05$) in the grades of sixth-grade students in Jordan in the mathematical concepts test according to the teaching strategy of the Digital Educational Games Blog (T.B) against the usual method. The value of (F) reached (8.13) with a statistical significance of (*0.00), which is a statistically significant value, indicating that there is an effect of the teaching method used. To determine in favor of whom the differences are attributed, the modified arithmetic averages and standard errors were extracted according to the group, as shown in Table 5.

**Table 5.**
Adjusted means and standard errors of the post-test math concepts test.

| Teaching method | Adjusted posttest mean | Std error |
|---|---|---|
| Educational electronic games (T.B) | 16.52 | 0.39 |
| Traditional | 14.79 | 0.39 |

The results in Table 5 indicate that the differences in post-test performance favored the experimental group exposed to digital educational games, which achieved higher adjusted scores (mean = 16.52) compared to the control group (mean = 14.79).

It is also clear from Table 5 that the size of the teaching method effect was good; the value of eta squared ($\eta^2$) explained 39% of the variance in the dependent variable, which is the mathematical concept development test. Thus, we reject the null hypothesis, which states that "there is no statistically significant difference at the level of significance ($\alpha = 0.05$) between the averages of the grades of sixth-grade students on the mathematical concept development test, attributed to the teaching method (control, experimental)," and we accept the alternative hypothesis, which states that "there is a statistically significant difference at the level of significance ($\alpha = 0.05$) between the averages of the grades of sixth-grade students on the mathematical concept development test, attributed to the teaching method (control, experimental)."

## 5. Discussion

The results of this study provide valuable insights into the impact of digital educational games on the enhancement of mathematical concepts among sixth-grade students in Jordan. Based on the alternative hypothesis ($H_1$), it was hypothesized that there would be a significant difference between the pre-test and post-test scores, reflecting an improvement in students' mathematical concepts after the training, where the experimental group (mean = 16.52) outperformed the control group (mean = 14.79). The effect was ($\eta^2 = 39\%$), indicating that the use of digital educational games contributes significantly to the development of students' mathematical concepts. These results reflect the efficiency of the digital method compared to the traditional method, especially in terms of simplifying complex concepts and increasing students' motivation to learn [28].

These findings align with previous Western studies, such as Marsh, et al. [23] and Laine and Lindberg [29], which emphasized the effectiveness of digital educational games in enhancing learning outcomes. However, the current study extends this understanding to a Jordanian context where the educational culture and available resources differ from Western settings. One possible explanation for the success of digital educational games is their ability to create an interactive and engaging environment, which contrasts with the more passive learning approach often associated with traditional methods in Jordan.

While Western studies have highlighted the benefits of these tools, it is crucial to consider local factors such as limited access to advanced technological infrastructure and varying teacher preparedness levels in integrating digital tools into teaching. These factors might impact the scalability and sustainability of similar interventions in other Jordanian schools.

The results showed an impact of using the digital educational games blog in developing mathematical concepts among sixth-grade students in Jordan. This was due to the teaching method applied to the experimental group, which utilized the digital educational games blog. The findings indicate that the teaching method used is effective for students, as it simplifies mathematical concepts and presents them in ways that attract their interest, making them clearer and more understandable.

Additionally, the use of digital educational games makes the learning experience more enjoyable and full of enthusiasm, which helps motivate students and increases their desire to explore and learn what is new in e-learning [30]. Games go beyond traditional methods of teaching and open new doors to innovative and exciting learning experiences that enhance students' understanding.

These results are consistent with the study of White and McCoy [25] and Fokides [26], which indicated the effectiveness of digital educational games and agreed with the current study's results. We also note the result of a study that pointed out that e-learning games are a form of learning based on the freedom of exploration, experimentation, and fun that they add to students. Additionally, the games were designed in a simplified and effective way, which increased their ability to solve mathematical problems [11].

The availability of many interactive and fun games on the site increased students' motivation and enthusiasm for learning. Games should have clear learning objectives, simple rules, and content appropriate to the learner's growth, with visual and auditory effects to enhance learning. Immediate feedback should be provided, as well as elements of suspense and reinforcement to ensure continuity of learning and motivate students to progress [13].

Mathematical mental concepts are difficult to understand and relate to reality, making traditional methods inadequate [22]. The power of games is to simplify complex mathematical concepts in a way that attracts students' attention, leading them to move away from the traditional pattern of learning those concepts and adopt a new strategy to understand them. Therefore, modern educational trends call for activating the role of the student by using technology and digital educational games to make learning more enjoyable and interactive [22].

The games also provided an opportunity for interaction and active participation, which contributed to promoting the positive development of mathematical concepts. Games encourage the development of mental skills such as critical thinking, problem-solving, and decision-making. The use of games enhances the fun and exciting elements in the learning process [5], making it more enjoyable and motivating for students to participate and interact. This results in an improvement in their performance on tests and their development of mathematical concepts.

## 6. Conclusion

The results of this study indicate that the use of digital educational games contributes significantly to enhancing the understanding of mathematical concepts among sixth-grade students in Jordan. A comparison of the results of previous and subsequent tests showed that the experimental team, which used the digital educational game blog, outperformed the control team. Digital games have also been shown to simplify complex mathematical concepts, making them more attractive to students, improving their motivation, and increasing their participation in the educational process.

The results also emphasize the importance of using modern technology in education, as digital games provide an interactive learning environment that encourages students to actively participate and helps them learn concepts in a fun and interesting way. Moreover, digital educational games highlight their role in enhancing students' critical thinking and problem-solving skills, which are essential for their academic success.

By integrating these games into the curriculum, students can be motivated to learn innovatively, improving their academic performance. The study recommends the continued use of these educational tools in various academic fields to enhance understanding.

### *6.1. Study Limitations*

Sample: The sample was selected from sixth-grade students in a single school in Jordan, which may affect the generalizability of the results to all students across different schools or educational institutions. The study sample was limited to a specific group with particular cultural and social backgrounds, which may impact the diversity of opinions and skills.

Time Duration: The study was conducted within a short time frame, which may not reflect long-term changes in students' visual thinking skills after using graphic design programs. Therefore, the results may not be representative of long-term future effects.

Techniques and Programs Used: The study utilized specific digital educational games, which may be limited compared to many other available programs. These selected games might not reflect the impact of more advanced or diverse game-based learning techniques that could better cater to different student needs and preferences.

### *6.2. Recommendations for Future Research*

Future research could employ a longitudinal strategy to assess the long-term effects of digital instructional games on student achievement and engagement. Additionally, broadening the sample to include students from different educational regions in Jordan will provide a more comprehensive understanding of the impact of digital learning tools.

The researcher suggests conducting additional studies with diverse designs and measurement tools to investigate the impact of using digital educational games across various subjects and educational stages. Teachers can create a more

dynamic, captivating, and productive learning environment for Jordanian students by addressing educational obstacles and leveraging the advantages of digital educational games.

## References


[1] N. Al-Otaibi and A. Al-Malki, "The impact of using augmented reality technology in developing mathematical concepts among elementary students in Mecca," *The International Journal of Educational and Psychological Sciences*, vol. 71, no. 1, pp. 156-192, 2021.

[2] A. Ibn Saqr and N. Abd al-Maqsoud, "The reality of the use of electronic games in education from the point of view of primary school teachers," *International Journal of Internet Education*, pp. 7-34, 2019.

[3] A. Jalloul, "The effectiveness of teaching according to the 'Marzano' Dimensions of Learning model in improving mathematics achievement among elementary school students," *Journal of Psychological and Educational Studies*, vol. 12, no. 3, pp. 131-149, 2019.

[4] I. V. Mullis, M. O. Martin, P. Foy, D. L. Kelly, and B. Fishbein, "TIMSS 2019 international results in mathematics and science," *Boston College, TIMSS & PIRLS International Study Center*, 2020.

[5] D. Abuabat and M. Al-Muhanna, "Electronic educational games and their relationship with learning motivation among elementary students on e-learning platforms from the teachers' perspective," *Journal of Educational and Psychological Sciences*, vol. 6, no. 56, pp. 58-80, 2022. https://doi.org/10.26389/ajsrp.l170722

[6] H. Al-Harran, "The impact of using electronic educational games in teaching social studies to intermediate school female students in Kuwait," *Journal of Reading and Knowledge*, vol. 22, no. 249, pp. 169-199, 2022.

[7] S. De Freitas, "Are games effective learning tools? A review of educational games," *Journal of Educational Technology & Society*, vol. 21, no. 2, pp. 74-84, 2018.

[8] A. Othman, "The impact of electronic games on the behaviors of upper elementary school children," *The Scientific Journal of the Faculty of Education*, vol. 1, no. 34, pp. 45-90, 2018.

[9] Z. Yu, M. Gao, and L. Wang, "The effect of educational games on learning outcomes, student motivation, engagement and satisfaction," *Journal of Educational Computing Research*, vol. 59, no. 3, pp. 522-546, 2021. https://doi.org/10.1177/0735633120969214

[10] N. Nasr, "The effectiveness of a kindergarten environment based on electronic educational games in developing children's creativity," presented at the The Fifth International Conference of the Environment Sector, Ain Shams University Cairo, Egypt, 2018.

[11] A. Al-Mazhar, "The degree to which elementary school teachers use electronic games in teaching mathematics from their perspective," *Journal of the Faculty of Education, Tanta University*, vol. 89, no. 4, pp. 270-290, 2023.

[12] T. Talan, Y. Doğan, and V. Batdı, "Efficiency of digital and non-digital educational games: A comparative meta-analysis and a meta-thematic analysis," *Journal of Research on Technology in Education*, vol. 52, no. 4, pp. 474-514, 2020. https://doi.org/10.1080/15391523.2020.1743798

[13] S. Al-Muzein and M. Al-Muzein, "The impact of using electronic educational games on developing mathematical concepts among kindergarten children," *Journal of Scientific Research in Childhood*, vol. 4, no. 13, 2023.

[14] M. O'Donnell, "Blogging as pedagogic practice: Artefact and ecology," *Asia Pacific Media Educator*, no. 17, pp. 5-19, 2006.

[15] S. Papadakis, M. Kalogiannakis, and N. Zaranis, "Teaching mathematics with mobile devices and the realistic mathematical education (RME) approach in kindergarten," *Advances in Mobile Learning Educational Research*, vol. 1, no. 1, pp. 5-18, 2021. https://doi.org/10.25082/amler.2021.01.002

[16] H. Hamza and B. Ahmed, "Developing and retaining mathematical concepts using the closmeyer model," *Journal of Educational and Psychological Sciences*, vol. 2, no. 128, pp. 203-255, 2017. https://doi.org/10.5220/0007042604410445

[17] A. Al-Sarhani, ""The impact of using augmented reality technology in developing some mathematical concepts among sixth-grade female students in Saudi Arabia," presented at the The Virtual International Conference on the Future of Digital Education in the Arab World, Taif, 2020.

[18] F. Ouraghi, "Understanding mathematical concepts and its relationship with mathematics achievement: A comparative study between male and female fourth-year middle school students," *Journal of Human and Social Studies*, vol. 2, pp. 157-174, 2017.

[19] D. Shafia and I. Boukra, "Constructive games and their relationship with the development of some mathematical concepts in kindergarten children from the perspective of educators," Master's Thesis, Mohammed Seddik Ben Yahia University, Jijel, Algeria, 2020.

[20] S. Majeed and G. Khazal, "Developing mathematical concepts among elementary school female students," *Journal of Intelligence Research*, vol. 16, no. 33, pp. 586-604, 2022.

[21] M. A. Alsmadi, A. A. Tabieh, R. M. Alsaifi, and S. J. Al-Nawaiseh, "The effect of the collaborative discussion strategy think-pair-share on developing students' skills in solving engineering mathematical problems," *European Journal of Educational Research*, vol. 12, no. issue-2-april-2023, pp. 1123-1135, 2023. https://doi.org/10.12973/eu-jer.12.2.1123

[22] L. Nadolny, A. Valai, N. J. Cherrez, D. Elrick, A. Lovett, and M. Nowatzke, "Examining the characteristics of game-based learning: A content analysis and design framework," *Computers & Education*, vol. 156, p. 103936, 2020. https://doi.org/10.1016/j.compedu.2020.103936

[23] J. Marsh, D. Yamada-Rice, J. Bishop, and F. Scott, "Digital play: A new classification," in digital play and technologies in the early years," Routledge, 2020, pp. 20-31.

[24] M. I. El-belkasy and S. A. Wahieb, "Sustainable conservation and reuse of historical city center applied study on Jeddah—Saudi Arabia," *Sustainability*, vol. 14, no. 9, p. 5188, 2022.

[25] K. White and L. P. McCoy, "Effects of game-based learning on attitude and achievement in elementary mathematics," *Networks: An Online Journal for Teacher Research*, vol. 21, no. 1, pp. 1-17, 2019. https://doi.org/10.4148/2470-6353.1259

[26] E. Fokides, "Digital educational games and mathematics. Results of a case study in primary school settings," *Education and Information Technologies*, vol. 23, no. 2, pp. 851-867, 2018. https://doi.org/10.1007/s10639-017-9639-5

[27] T. N. and A. Zaitouni, "The positive and negative effects of electronic games on middle school students," *Journal of Studies in the Psychology of Deviation*, vol. 8, no. 1, pp. 83-102, 2023.

[28] A. J. Al-Nawaiseh, A. Albtoush, and S. J. Al-Nawaiseh, "Evaluate database management system quality by analytic hierarchy process (AHP) and simple additive weighting (SAW) methodology," *Mendel*, vol. 28, no. 2, pp. 67-75, 2022. https://doi.org/10.13164/mendel.2022.2.067

[29] T. H. Laine and R. S. Lindberg, "Designing engaging games for education: A systematic literature review on game motivators and design principles," *IEEE Transactions on Learning Technologies*, vol. 13, no. 4, pp. 804-821, 2020.

[30] A. A. Tabieh and M. Hamzeh, "The impact of blended-flipped learning on mathematical creative thinking skills," *Journal of Educators Online*, vol. 19, no. 3, p. 3, 2022.