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The Effect of the Use of Media Maze Game on the Understanding of Real Number Concepts in Grade 1 Elementary School Students

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Abstract
This research is motivated by the low understanding of the concept of real numbers of grade I students due to less varied learning and still teacher-centered, so the use of visual, interactive, and fun Maze Game media is needed to increase student engagement and understanding. Quantitative approach used is the experimental method. The population is 1st grade students of SD Gugus 03, East Telukjambe District, totaling 9 elementary schools for the 2025/2026 school year. Cluster random sampling technique, then the experimental class was determined, namely grade 1 of SD Negeri Wadas IV with a total of 32 students in the experimental class and a control class totaling 32 students. Data is collected through tests measuring students' understanding of the concept of real numbers. The data was analyzed using statistical tests. The findings showed that the Maze Game media had a positive and significant influence on students' understanding of the concept of real numbers among first-grade students, with a t value of 7.096 and a p value of <0.05. Students who use Maze Game media show a higher level of conceptual understanding compared to those who receive conventional learning. Therefore, the Maze Game media can be considered an effective alternative math learning medium to improve elementary school students' understanding of the concept of real numbers.
Keywords: *Learning Media, Maze Game, Concept Comprehension, Natural Numbers.*

Abstrak
Penelitian ini dilatarbelakangi oleh rendahnya pemahaman konsep bilangan asli siswa kelas I akibat pembelajaran yang kurang variatif dan masih berpusat pada guru, sehingga diperlukan penggunaan media Maze Game yang bersifat visual, interaktif, dan menyenangkan untuk meningkatkan keterlibatan serta pemahaman siswa. Pendekatan kuantitatif yang digunakan yaitu metode eksperimental. Populasi yaitu siswa kelas 1 SD Gugus 03 Kecamatan Telukjambe Timur, berjumlah 9 SD tahun ajaran 2025/2026. Teknik sampel cluster random sampling, kemudian ditentukan kelas eksperimen yaitu kelas 1 SD Negeri Wadas IV dengan total 32 siswa kelas eksperimen dan kelas kontrol berjumlah 32 siswa. Data dikumpulkan melalui tes mengukur pemahaman siswa tentang konsep bilangan asli. Data dianalisis menggunakan tes statistik. Hasil menunjukkan media Maze Game memiliki pengaruh positif dan signifikan terhadap pemahaman siswa tentang konsep bilangan asli di kalangan siswa, dengan nilai t 7,096 dan nilai p <0,05. Siswa yang menggunakan media Maze Game menunjukkan tingkat pemahaman konseptual yang lebih tinggi dibandingkan dengan mereka yang menerima pembelajaran konvensional. Oleh karena itu, media Maze Game dapat dianggap sebagai media pembelajaran matematika alternatif yang efektif untuk meningkatkan pemahaman siswa sekolah dasar tentang konsep bilangan asli.
Kata kunci: Media Pembelajaran, Permainan Labirin, Pemahaman Konsep, Bilangan Asli.

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INTRODUCTION

Basic education is the main foundation in shaping students' thinking skills and understanding of concepts, especially in mathematics subjects. Mathematics in elementary school not only aims to make students able to calculate, but also understand basic concepts that are prerequisites for learning at the next level (Sakulwichitsintu et al., 2018; Sutama et al., 2024). The urgency of this research lies in the still low understanding of the concept of natural numbers in grade I elementary school students, even though the concept is an important foundation for the success of mathematics learning at the next level; in addition, learning practices that are still centered on the teacher and the lack of use of varied media cause low student involvement, so that innovations in learning media such as Maze Games are needed which are able to improve understanding of concepts more effectively, interactively, and enjoyably. One of the basic concepts that is very important for elementary school grade I students to master is the concept of real numbers. Understanding the concept of real numbers includes the ability to recognize number symbols, relate numbers to the number of objects, compare, and order numbers correctly (Abdullah et al., 2015; Setyaningsih et al., 2019).

In fact, learning mathematics in the early grades of elementary school still faces various obstacles. Many students have difficulty understanding the concept of numbers because learning tends to be abstract and does not involve concrete activities and games that are in accordance with the characteristics of early childhood development (Dema Yulianto et al., 2023; Kosasih et al., 2025). Grade I elementary school children are at the concrete operational stage, so they need visual, manipulative, and interactive learning media so that mathematical concepts can be better understood, Concept Understanding is a theoretical foundation that explains how a person understands, builds, and uses a concept meaningfully, not just memorize (Lici, 2021; Pakpahan & Saragih, 2022; Piaget, 1971).

Learning media has an important role in helping students understand the subject matter. According to (Afrianti et al., 2023; Qalbi et al., 2020; Wulandari & Relmasira, 2025), learning media can clarify the presentation of messages, increase students' attention and motivation to learn, and help overcome the limitations of space, time, and sensory power. The use of appropriate media in mathematics learning can make the learning process more meaningful and enjoyable, especially for elementary school students.

To date, various studies have shown that the learning media used to improve understanding of mathematical concepts generally consist of concrete media, pictures, number cards, and simple visual student worksheets (LKS). Although quite helpful, these media still have limitations, such as being less interactive, less engaging, and unable to optimally encourage active student engagement because they tend to be one-way and repetitive. This condition is exacerbated by learning practices that are still teacher-centered. Therefore, innovations in learning media are needed that are more varied and enjoyable, such as the Maze Game, which is interactive, challenging, and able to actively engage students, so it is hoped that it can improve understanding of natural number concepts more effectively.

One of the learning media that can be used in learning real numbers is the Maze Game media. Maze Game is a maze-shaped educational game that requires students to find the right path according to certain rules or commands. This medium can be developed by incorporating elements of numbers, such as matching the number of objects with the number symbol, sorting numbers, or choosing the correct number to

achieve the game's objectives. According to (Almanthari et al., 2016; Syaheera et al., 2023; Van Dooren et al., 2019) game-based learning is able to increase motivation, active involvement, and understanding of students' concepts because it combines elements of learning and play in a balanced manner.

The use of Maze Game in mathematics learning is believed to be able to improve the understanding of real number concepts because students are directly involved in the process of finding answers through play activities. Students not only passively receive information, but actively think, try, and correct mistakes during the game. This is in line with the opinion (Bruner, 1961) which states that learning will be more meaningful if students discover the concepts learned through direct experience. Based on this description, research is needed to further examine the influence of the use of Maze Game media on the understanding of the concept of real numbers in grade I students of SDN Wadas IV. This research is expected to contribute to teachers in choosing innovative learning media and improve the quality of mathematics learning in the early grade of elementary school.

METHODS

This research adopts a quantitative approach employing an experimental method, as it seeks to examine the impact of a specific treatment on selected variables under controlled conditions (Creswell, 2017). The research design used is a pretest–posttest control group design, which involves two research groups: the experimental class and the control class. The population in this study were 1st grade elementary school students in Cluster 03 of Telukjambe Timur District, Karawang Regency, totaling 9 elementary schools in the 2025/2026 academic year. The research subjects are grade I students of SDN Wadas IV. The experimental class of 32 students obtained mathematics learning using the Maze Game media, while the control class of 32 students obtained conventional learning. The sample selection in this study used a cluster random sampling technique. Data collection was carried out through a test of understanding of the concept of natural numbers given before and after treatment. The data were examined through descriptive statistical analysis to describe students' learning outcomes, while inferential statistics were applied to test the research hypotheses. Assumption testing included normality and homogeneity tests, and hypothesis testing was conducted using an independent samples *t*-test with a significance level of 0.05. (Ghozali, 2018).

RESULTS AND DISCUSSION

The research data were derived from pretest and posttest results measuring students' understanding of real number concepts in both the experimental and control groups. Descriptive statistical analysis was applied to provide an overall depiction of students' learning outcomes prior to and following the implementation of the treatment.

Tabel 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-Test Eksperimen	32	54	78	64.97	7.186
Post-Test Eksperimen	32	80	94	86.09	4.553
Pre-Test Kontrol	32	55	82	67.06	8.435
Post-Test Kontrol	32	67	88	76.34	6.078
Valid N (listwise)	32				

Source: data processing results 2025

Based on the results of descriptive statistics, students' understanding of the concept of real numbers in the experimental class and the control class improved after learning. In the experimental class (N = 32), the average pre-test score of 64.97 with a standard deviation of 7.186 increased to 86.09 with a standard deviation of 4.553 in the post-test, indicating a high improvement and more even learning outcomes after the use of Maze Game media. Meanwhile, in the control class (N = 32), the average pre-test score of 67.06 with a standard deviation of 8.435 increased to 76.34 with a standard deviation of 6.078 in the post-test. Overall, the increase in average value and the decrease in standard deviation in the experimental class was greater than in the control class, which indicates that the use of Maze Game media was more effective in improving the understanding of the concept of real numbers for grade I students of SDN Wadas IV.

Tabel. 2 Tests of Normality

	Kelas	Shapiro-Wilk Statistic	df	Sig.
Results	Pre Test (Kontrol)	.930	32	.138
	Post Test (Kontrol)	.910	32	.112
	Pre Test (Eskperimen)	.938	32	.266
	Post Test (Eksperimen)	.920	32	.324

a. Lilliefors Significance Correction

Source: data processing results 2025

Based on the results of the normality test using the shapiro-wilk method, because the data was less than 100 with the Lilliefors significance correction, the significance value in the pre-test and post-test data of both the control class and the experimental class was all greater than 0.05. The significance value of the pre-test in the control class was 0.138 and the post-test was 0.112, while in the experimental class the pre-test significance value was 0.266 and the post-test was 0.324. These results show that all data are distributed normally, so they are eligible for parametric statistical analysis at the next stage.

Tabel. 3 of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Results	Based on Mean	6.405	1	62	.235
	Based on Median	4.645	1	62	.147
	Based on Median and with adjusted df	4.645	1	54.274	.148
	Based on trimmed mean	6.463	1	62	.041

Source: data processing results 2025

The homogeneity of variance was examined using Levene's Test. The results indicated that the significance values based on the mean (0.235) and the median (0.147) exceeded the 0.05 threshold, suggesting that the variances of the experimental and control groups were equal. Although the significance value calculated from the trimmed mean was 0.041, which is below 0.05, decisions regarding variance homogeneity in parametric testing are typically based on the mean value. Therefore, the data satisfy the assumption of variance homogeneity and are appropriate for further analysis using parametric statistical procedures.

Tabel. 4 Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Results	Equal variances assumed	4.662	.035	7.188	62	.000	9.371	1.304	6.767	11.974
	Equal variances not assumed			7.096	57.146	.000	9.371	1.320	6.726	12.015

Source: data processing results 2025

The statistical analysis produced a *t* value of 7.096 with 57.146 degrees of freedom and a significance level of $p = 0.000$, which is lower than 0.05. This result indicates a statistically significant difference in the mean learning outcomes of students between the experimental group and the control group.

The mean difference of 9.371 indicates that students in the experimental group demonstrated a higher average level of understanding of real number concepts than those in the control group. The 95% confidence interval, ranging from 6.726 to 12.015, does not include zero, which further confirms the statistical significance of the difference. Therefore, it can be concluded that the implementation of Maze Game as a learning medium has a significant impact on first-grade students' understanding of real number concepts at SDN Wadas IV.

The results of the study showed that the use of Maze Game media had a significant influence on the understanding of the concept of real numbers for grade I students of SDN Wadas IV. This is evidenced by the higher average post-test score of the experimental class than the control class and the results of the independent samples t-test which showed a significance value of $p < 0.05$. These findings indicate that learning mathematics by utilizing Maze Game media is more effective than conventional learning in improving understanding of real number concepts.

The increase in conceptual understanding in experimental classes can be explained through Piaget's theory of cognitive development, which states that students in the early grades of elementary school are at a concrete operational stage, thus requiring learning that involves direct activities and concrete visualizations(Jalandoni & Futalan, 2024; Villarreal et al., 2023). The Maze Game media allows students to interact directly with numbers through play activities, such as matching number symbols to the number of objects and determining the order of numbers, making the concepts learned easier to understand.

The results of this study are in line with the constructivist learning theory which emphasizes that knowledge is actively constructed by students through learning experiences (Khalid & Embong, 2019; Singh et al., 2021). In the use of Maze Game, students not only receive information from the teacher, but actively seek the right path, make decisions, and correct mistakes during the game. This process encourages the formation of a deeper and more meaningful understanding of concepts. The findings of this study also support the results of previous research that stated that game-based learning can improve the motivation, engagement, and learning outcomes of elementary school students (Andriani et al., 2023; Mulyawati & Elizabeth, 2023). The use of Maze Game as an instructional medium creates an enjoyable and stimulating learning environment, which encourages students to be more attentive and motivated during mathematics lessons. This learning condition contributes to improved academic

performance in the experimental group. In addition to the increase in mean scores, the reduction in the standard deviation within the experimental class indicates a more uniform understanding of real number concepts among students. This suggests that Maze Game media is effective not only for high-achieving learners but also supports students with moderate and lower abilities in developing a better grasp of numerical concepts. These findings are consistent with previous studies (Lifindra et al., 2023; Mahpuz et al., 2021; Steinmaurer et al., 2019), which emphasize that appropriate instructional media can help address differences in students' learning abilities. Therefore, Maze Game media can serve as an innovative and effective alternative for mathematics instruction to enhance first-grade elementary students' understanding of real number concepts. The findings of this study are expected to provide useful references for teachers in designing more creative learning activities that align with the characteristics of early-grade learners.

CONCLUSION

Based on the results of the study, it can be concluded that the use of Maze Game learning media has a significant effect on the understanding of the concept of real numbers in grade I elementary school students, which is shown by the increase in the average score of student learning outcomes in the experimental class which is higher than that of the control class and the results of statistical tests with a significance value of $p < 0.05$. Media Maze Game has proven to be able to create more interactive, concrete, and fun learning, thereby helping students understand the concept of real numbers through play activities that are in accordance with the developmental characteristics of early grade students. Practically, the results of this study imply that elementary school teachers are advised to use game-based learning media such as Maze Game as an alternative in mathematics learning, especially in real number materials, to increase student engagement and understanding. In addition, schools can support the use of innovative media by providing facilities and training for teachers to be able to develop and implement creative learning media. For future researchers, the results of this research can be used as a reference to develop Maze Game media on other mathematics materials or combine them with different learning approaches to improve the quality of learning in elementary schools.

BIBLIOGRAPHY

Abdullah, M., Hastuti, W., & Karmila, A. (2015). Lego (Puzzle Bingo) Games: Media Edukatif Berbasis Pendidikan Karakter pada Anak Usia Sekolah Dasar dalam Mewujudkan Generasi Indonesia Emas. *Pena: Jurnal Kreativitas Ilmiah Mahasiswa Unismuh*, *2*(1), 296–307.

Afrianti, R., Novianti, R., & Solfiah, Y. (2023). Pengaruh Permainan Maze Chase Terhadap Kemampuan Mengenal Konsep Pola Pada Anak Usia 5-6 Tahun Di TK Surya Pertiwi Kabupaten Rokan Hulu. *Innovative: Journal Of Social Science Research*, *3*(2), 11822–11835.

Almanthari, A., Maulina, S., & Bruce, S. (2016). Secondary School Mathematics Teachers' Views on E-Learning Implementation Barriers during the COVID-19 Pandemic: The Case of Indonesia. *Eurasia Journal of Mathematics, Science and Technology Education*, *7*(4).

Andriani, R., Apriani, F., Damayanti, S., Satria, O., Aulia, Y., & Irmansyah, A. (2023). Game Ular Tangga: Media Edukatif dan Persuasif Dalam Memilih Jajanan Sehat Bagi Anak Usia Sekolah Dasar. *Prosiding Seminar Nasional Pengabdian Masyarakat*, *1*. https://doi.org/10.61142/psnpm.v1.83

Bruner, J. S. (1961). *"The Act of Discovery" Inquiry Techniques For Teaching Science*. Prentice Hall, INC., Englewood Cliffts.

Creswell, J. W. . (2017). *Research design : qualitative, quantitative, and mixed methods*

approaches. SAGE.

Dema Yulianto, Maryana, Sumarni Rumfot, Muhammad Ridhwan, & Jasiah. (2023). GAME'S APPLICATION: Learning Method Using Maze Game Media to Increase the Learning Outcomes of Early Childhood Students. *Journal of Childhood Development*, *3*(2), 1–8. https://doi.org/10.25217/jcd.v3i2.3365

Jalandoni, J. F., & Futalan, M. C. (2024). Scaffolding Students' Difficulties in Addition and Subtraction of Integers Through Game-Based Instruction. *Journal of Interdisciplinary Perspectives*, *2*(7). https://doi.org/10.69569/jip.2024.0143

Khalid, M., & Embong, Z. (2019). Sources and Possible Causes of Errors and Misconceptions in Operations of Integers. *International Electronic Journal of Mathematics Education*, *15*(2). https://doi.org/10.29333/iejme/6265

Kosasih, U., Kusumaningtyas, S., & Saputra, S. (2025). STUDENT RETENTION IN ARITHMETIC SEQUENCES AND SERIES LEARNING THROUGH MATH MAZE. *Journal of Authentic Research on Mathematics Education (JARME)*, *7*(2).

Lici, L. (2021). Meningkatkan Hasil Belajar Matematika Siswa Tentang Pengurangan Bilangan Bulat Menggunaan Media Kartu Bilangan. *Bitnet: Jurnal Pendidikan Teknologi Informasi*, *6*(2), 10–16. https://doi.org/10.33084/bitnet.v6i2.2710

Lifindra, B. H., Herumurti, D., & Kuswardayan, I. (2023). The Effects of Mathematics Game-based Learning with Random Maze Generation. *2023 International Seminar on Application for Technology of Information and Communication (ISemantic)*, 69–74. https://doi.org/10.1109/iSemantic59612.2023.10295276

Mahpuz, M., Bahtiar, H., Fathurahman, F., & Nur, A. M. (2021). Pelatihan pembinaan UMKM berbasis Teknologi Informasi untuk meningkatkan SDM pelaku UMKM. *ABSYARA: Jurnal Pengabdian Pada Masyarakat*, *2*(2), 212–219. https://doi.org/10.29408/ab.v2i2.4206

Mulyawati, Y., & Elizabeth, Y. (2023). Development of Maze Case Games Based on Word Walls the Theme of My Heroes in Improving Elementary School Students' Critical Thinking Ability. *PrimaryEdu : Journal of Elementary Education*, *7*(1), 74–89.

Pakpahan, F. H., & Saragih, M. (2022). Theory Of Cognitive Development By Jean Piaget. *Journal of Applied Linguistics*, *2*(2), 55–60. https://doi.org/10.52622/joal.v2i2.79

Piaget, J. (1971). *The science of education and psychology of the children*. Longman.

Qalbi, Z., Marlina, S., Febryan Putera, R., Hidayati, I., & Eka Daryati, M. (2020). Pengaruh Permainan Maze Terhadap Kemampuan Bercerita di TK Negeri 1 Padang Baru. *Jurnal Pelita PAUD*, *4*(2), 287–294. https://doi.org/10.33222/pelitapaud.v4i2.1013

Sakulwichitsintu, S., Colbeck, D., Ellis, L., & Turner, P. (2018). A Peer Learning Framework for Enhancing Students' Learning Experiences in Online Environments. *2018 IEEE 18th International Conference on Advanced Learning Technologies (ICALT)*, 168–169. https://doi.org/10.1109/ICALT.2018.00123

Setyaningsih, N., Rejeki, S., & Ishartono, N. (2019). Developing Realistic and Child-friendly Learning Model for Teaching Mathematics. *JRAMathEdu (Journal of Research and Advances in Mathematics Education)*, *4*(2), 79–88. https://doi.org/10.23917/jramathedu.v4i2.8112

Singh, P., Hoon, T. S., Nasir, A. M., Rasid, S. ., & Meng, C. . (2021). Card Game as a Pedagogical Tool for Numeracy Skills Development. *International Journal of Evaluation and Research in Education*, *10*(2), 693–705.

Steinmaurer, A., Pirker, J., & Gütl, C. (2019). sCool – Game-Based Learning in Computer Science Class: A Case Study in Secondary Education. *International Journal of Engineering Pedagogy (IJEP)*, *9*(2), 35. https://doi.org/10.3991/ijep.v9i2.9942

Sutama, I. W., Astuti, W., & Pramono. (2024). Improving 21st Century Competencies: Implementation of Problem- and Project-Based Digital Maze Games in Early

Childhood. *Jurnal Pendidikan Anak Usia Dini Undiksha*, *12*(1), 177–185. https://doi.org/10.23887/paud.v12i1.69997

Syaheera, N., Asyrani, H., Akmal, N., & Asmawanty. (2023). MMZ: A Study on the Implementation of Mathematical Game-based Learning Tool. *International Journal of Advanced Computer Science and Applications*, *14*(1), 218–224.

Van Dooren, W., De Bock, D., De Wever, B., & Janssens, D. (2019). A Review of Research on the Impact of Conceptual Understanding in Mathematics Education. *Review of Educational Research*, *88*(4), 679–715.

Villarreal, M. E., Villa-Ochoa, J. A., & Galleguillos, J. (2023). Experiences of preservice mathematics teachers during their education in times of pandemic. *ZDM – Mathematics Education*, *55*(1), 235–248. https://doi.org/10.1007/s11858-022-01461-4

Wulandari, F., & Relmasira, S. C. (2025). Enhancing Fourth-Grade Students' Logical Thinking in Mathematics Through Interactive Math Board Learning Media. *Journal of Innovation and Research in Primary Education*, *4*(4), 1990–1999. https://doi.org/10.56916/jirpe.v4i4.1998