THE EFFECT OF KAHOOT GAMIFICATION STRATEGY ON IMPROVING MATH COMPREHENSION IN ELEMENTARY SCHOOL STUDENTS

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Abstract

Mathematics is one of the subjects that is considered difficult and less attractive, which has an impact on students' low understanding of concepts. One of the obstacles in learning is the limitation of technology, especially the unavailability of adequate computer equipment in the classroom. This condition hinders the application of interactive learning media that can increase student interest and understanding. This study aims to analyze the effect of gamification strategy using Kahoot technology on improving mathematics understanding of grade 3 elementary school students. The method used was a quasi-experiment with a quantitative approach, comparing two classes: an experimental group using Kahoot and a control group using conventional learning methods. The research was conducted in grade 3 of MI Muhammadiyah Gonilan. Data analysis included normality test, Wilcoxon test, and N-gain test. The results showed the average post-test score of the control class was 74.73 and the experimental class was 82.10. The findings show that gamification strategy using Kahoot has a positive and significant effect on improving students' math comprehension.

Keywords: Gamification; Kahoot; Math Comprehension

Abstrak

Matematika merupakan salah satu mata pelajaran yang dianggap sulit dan kurang diminati, sehingga berdampak pada rendahnya pemahaman konsep siswa. Salah satu hambatan dalam pembelajaran adalah keterbatasan teknologi, khususnya tidak tersedianya perangkat komputer yang memadai di kelas. Kondisi ini menghambat penerapan media pembelajaran interaktif yang dapat meningkatkan minat dan pemahaman siswa. Penelitian ini bertujuan untuk menganalisis pengaruh strategi gamifikasi menggunakan teknologi *Kahoot* terhadap peningkatan pemahaman matematika siswa kelas 3 Sekolah Dasar. Metode yang digunakan adalah kuasi eksperimen dengan pendekatan kuantitatif, membandingkan dua kelas: kelompok eksperimen yang menggunakan *Kahoot* dan kelompok kontrol yang menggunakan metode pembelajaran konvensional. Penelitian dilakukan di kelas 3 MI Muhammadiyah Gonilan. Analisis data mencakup uji normalitas, uji Wilcoxon, dan uji N-gain. Hasil menunjukkan rata-rata nilai post-test kelas kontrol sebesar 74,73 dan kelas eksperimen sebesar 82,10. Temuan ini menunjukkan bahwa strategi gamifikasi menggunakan *Kahoot* berpengaruh positif dan signifikan terhadap peningkatan pemahaman matematika siswa.

Kata Kunci: Gamifikasi; Kahoot; Pemahaman Matematika

Introduction

Mathematics is often considered a difficult and uninteresting subject for primary school students. This can lead to low student understanding of important mathematical concepts as the basis for learning at the next level of education. Therefore, innovative and effective learning strategies are needed to increase students' interest and understanding in learning mathematics. The utilization of technology in education can create a more interactive, engaging and

personalized learning environment. One form of technology utilization that is increasingly popular is the application of gamification strategies in learning. The utilization of technology has a role that can make the learning process more effective, easier to develop student knowledge, more in-depth subject matter and provide extensive information that can improve student learning achievement as long as it is used effectively and appropriately. (Alfidya Pagau & Mytra, 2023). The use of technology in mathematics learning can at least provide positive benefits, namely technology can improve mathematics learning outcomes and technology can improve mathematics teaching techniques. (Putrawangsa & Hasanah, 2018). Other studies use technology such as interactive math software, learning apps, or online math games to make learning more engaging and relevant to learners. (Maulida et al., 2024).

Education in today's digital age faces the challenge of creating teaching strategies that are not only effective but also engaging for students. One approach that is gaining popularity is gamification, which integrates game elements in a learning context to increase student motivation and engagement. Gamification is the process of using game elements in non-game conditions with the goal of reinforcing positive learning behaviors (Ariani, 2020). Gamification is a method of learning that integrates games with elements such as points, badges, levels, leaderboards, and avatars, which is very suitable for learning (Lovandri et al., 2024). In the context of education, the application of gamification has been proven to increase students' interest and understanding of subject matter, including mathematics. Meanwhile, research by Hakeu et al., (2023) how's that the utilization of Gamification-based learning strategies in the learning process is very effective to make the learning process more effective and attract students' thinking. One of the popular technology platforms used in gamification of learning is Kahoot! a game-based learning application that allows students to actively participate in the learning process.

Kahoot! is a game-based learning platform that allows teachers to create interactive and engaging quizzes for students. Kahoot! quizzes can be accessed by students through their respective devices, such as smartphones or tablets. This allows students to learn actively and collaboratively, and get immediate feedback on their answers. Kahoot! transforms quizzes into engaging games (Sulistiyawati et al., 2021). This online platform allows for quiz creation and presentation, awarding points for correct answers and providing immediate feedback to learners. The top responders for each question are listed and at the end of the game session the winners are displayed in order. Kahoot is a learning application platform that can be used by all ages with attractive and easy-to-use features from elementary school children to university students can use this platform (Fazriyah et al., 2020). While research according to Anviani (2022) Kahoot is a modified game-based application that can increase effectiveness and have an impact on improving student learning outcomes in the cognitive aspects of understanding (C2), applying aspects (C3), analyzing aspects (C4), and evaluating aspects (C5).

In the context of mathematics education, understanding basic concepts is very important for students. Previous research shows that the use of interactive learning media such as Kahoot not only improves learning outcomes but also makes the learning process more fun and interesting for students. This is very relevant considering the challenges faced by students in understanding mathematical concepts that are often considered difficult. Therefore, the application of Kahoot as a gamification tool is expected to help students understand the material in a more interactive and fun way. For example, research conducted by Nakiyemba (2024) evealed that integrating gamification elements into educational platforms and training programs consistently resulted in increased knowledge acquisition across multiple contexts. In addition,

another study by Jusuf (2016) in the learning process using gamification, provides an alternative to make the learning process more interesting, fun and effective. Another research by Anggraeni & Sujatmiko (2021) Gamification in learning can affect student learning activities to be more active in participating in the learning process thereby increasing engagement and being more motivated to learn.

Table 1. Indicators of Mathematical Understanding

Variable	Aspect	Indicators
Math Comprehension	Ability to understand concepts	Students can understand math concepts better with the help of Kahoot.
	Ability to solve problems	Students find it easier to do math problems.
	Speed of understanding the material	Students understand the material more quickly.

Indicators of mathematical understanding are an individual's ability to absorb and understand mathematical ideas (Hermawan et al., 2021).Indicators of mathematical understanding according to the Director General of Education and Culture Number 506/C/Kep/PP/2004 in Shofiah et al., (2021) detailing the indicators of mathematical concept understanding are that students are able to: (1) Restate a concept, (2) Classify objects according to certain properties, (3) Provide examples and non-examples of a concept, (4) Present concepts in various forms of mathematical representations, (5) Develop necessary or sufficient conditions of a concept, (6) Use and utilize and select certain procedures or operations, (7) Applying concepts or algorithms in problem solving. Meanwhile, according to Duffin dan Simpson in Giriansyah et al., (2022) The indicators of mathematical understanding are students in re-expressing what has been communicated to them, using concepts in a variety of different situations, and developing several consequences of a concept. While other studies say indicators of mathematical understanding can include: (1) Reveal an idea, (2) Categorizing objects according to their properties, (3) Determining examples and non-examples of ideas, (4) Selecting and using certain procedures or operations, (5) Applying ideas or algorithms in problem solving (Nuraeni et al., 2018).

The positive impact of using Kahoot in math learning is also supported by various studies that show significant improvements in student motivation and comprehension after implementing this strategy. Based on research Alianas (2023) It can be seen that the use of kahoot educational game media in teaching and learning activities can be used as an alternative to overcome educational problems such as low learning outcomes. In addition, research by Puspitasari et al., (2023) There is an effect of Kahoot users as a game-based learning media on students' interest in learning and learning outcomes and there is a correlation between interest and learning outcomes. In the research Emilio et al., (2024) showed that the use of Kahoot significantly increased student engagement and deepened their understanding of the learning material. With this approach, it is expected that students will not only be able to recall information but also understand mathematical concepts better.

The problem in learning at MI Muhammadiyah Gonilan is still dominated by the use of the lecture method where the teacher is the center of learning activities while students tend to be passive and make students less actively involved in the learning process and only receive information. The lack of use of technology in learning is also an obstacle in creating an interactive and interesting learning atmosphere for students. In fact, the use of educational technology can increase student involvement and facilitate deeper understanding of concepts. Therefore, the researcher intends to apply gamification strategy using Kahoot technology as a

solution to overcome this problem. This study aims to analyze how the use of gamification strategy by utilizing Kahoot technology can affect the improvement of students' understanding of mathematics material in grade 3 elementary school students. Through this approach, it is expected that learning can be more interesting, interactive, and able to improve student understanding, especially in mathematics subjects in grade 3. With the results of this study, it is hoped that it can provide new insights for educators in designing learning strategies that are more effective and interesting, so that they can help students better understand mathematical concepts.

This research presents a novelty in its approach to mathematics learning. The use of Kahoot is not only used as an evaluation tool, but is integrated as a gamification strategy in the learning process. This approach shows a new way of utilizing interactive media to promote understanding of mathematical concepts more effectively. The focus of this research also lies on measuring students' in-depth understanding of mathematics, not just achieving grades or increasing learning motivation. In addition, using a quantitative approach to assess the effectiveness of popular media such as Kahoot makes an important contribution in strengthening empirical evidence on the impact of educational technology on student learning in a measurable and systematic way.

Research Methods

Learning at MI Muhammadiyah Gonilan still uses the lecture method, so the teacher is the center of activity and students are only listeners. As a result, students are less active and not much involved in the learning process. In addition, the use of technology in learning is still minimal, so the classroom atmosphere is less interesting and interactive. To overcome this, the researcher wants to try a gamification strategy using Kahoot. The purpose of this research is to find out whether the use of Kahoot can help improve students' understanding of grade 3 math materials. This study used a quantitative method with a quasi-experimental design. This method was chosen because it allows researchers to measure variables numerically and conduct statistical analysis to obtain objective results (Creswell, 2014). In this design, two classes will be compared: one class using Kahoot gamification strategy (experimental group), and another using conventional learning method (control group). Class selection was not randomized due to time constraints and conditions in the field, so researchers used existing classes (Sugiyono, 2018).

This research was conducted in the odd semester of the 2024/2025 school year, precisely in November 2024, at MI Muhammadiyah Gonilan. The population in this study were all grade 3 students at MI Muhammadiyah Gonilan in Surakarta City. From this population, the researcher took two classes as samples, namely class 3A as the experimental group and class 3B as the control group. Each class consisted of 19 students, so the total sample in this study was 38 students. The determination of the sample was carried out by purposive sampling, where the selected class had similar characteristics (Arikunto, 2013). Data were collected through math comprehension tests given before and after the treatment. This test consisted of 5 essay questions covering various mathematical concepts taught. Before conducting the test, researchers conducted validity and reliability tests to ensure that the instruments used could measure students' mathematical understanding properly. The data obtained will be analyzed using descriptive statistical techniques, namely (1) Normality test to ensure that the data used meets the normality assumptions required in some parametric statistical tests, (2) The homogeneity test aims to determine whether several groups of data samples have the same variance, (3) The

independent t-test aims to compare the means of two different groups, provided that the underlying assumptions are met, and if the data is not normally distributed use the Wilcoxon Test instead, (4) The N-gain test aims to determine the effectiveness of using a method or treatment.

Results and Discussion

This research was conducted in the odd semester of the 2024/2025 academic year, precisely in November 2024, at MI Muhammadiyah Gonilan. The research process used a quasi-experimental design. This study involved two classes, namely class 3A as an experimental class that received learning using the kahoot gamification strategy, and class 3B as a control class that used conventional learning. Before the treatment, both classes were given a pretest to measure students' initial math skills related to mixed number operations. The post-test was given after the treatment. Then the data obtained were processed and analyzed as follows:

The validity test of this research instrument is carried out to ensure that the measuring instrument used actually measures what should be measured. Validity in this study refers to the extent to which the instrument is able to measure the concept of mathematical understanding accurately and precisely (Azwar, 2013). Validity determines how accurate the measuring instrument is in carrying out its function, providing precise and accurate results in accordance with the measurement objectives. Validity also shows the extent to which a measured variable is really the variable to be studied. According to (Sugiyono, 2019). The validity test is the degree of accuracy between the data that occurs in the research object and the data reported by the researcher. In validity testing, an instrument or question item is considered valid if r count ≥ r table on a two-sided test with a significance of 0.05. Based on the results of the validity test conducted, of the 10 essay questions tested, 7 questions were declared valid and 3 questions were declared invalid. 3 invalid questions can be caused by questions that are made less clear so that they make respondents confused about choosing answers. While 7 valid questions are proven to meet the criteria and achievements of the grid, and in accordance with learning indicators. Valid questions will be used as research instruments to measure the results of students' mathematical understanding.

Reliability testing is a process to measure the consistency and stability of the results of a research instrument when used on various occasions. Reliability shows the extent to which the results obtained from measurements can be replicated. A reliable instrument will produce consistent results when measurements are repeated under the same conditions. According to (Slamet & Wahyuningsih, 2022) Reliability is an index that shows the extent to which a measuring instrument can be trusted or reliable. The reliability test is the extent to which the measurement results using the same object will produce the same data. Thus, high reliability increases the credibility of the research results, because it shows that the results are not coincidental or affected by irrelevant variables. . In this study, 0.60 was chosen as the reliability coefficient. The data results can be seen in Table 2.

Table 2. Reliability Test Results

Reliability Statistics	
Cronbach's Alpha	N of Items
.687	10

Based on SPSS output, the Cronbach's Alpha value is 0.687. This value is greater than 0.60. This means that the consistency in the questionnaire question items is reliable or reliable. So that the questions can be used to measure student understanding.

Descriptive analysis in this study aims to provide a clear picture of the results of the use of Kahoot! gamification technology on mathematics understanding of grade 3 elementary school students. This analysis includes descriptive statistics such as the average (mean) value of students' math test results before and after being given treatment in the post-test and pre-test. By comparing these values, differences in performance or characteristics between the experimental and control classes can be seen. The following are the data results of the mean pre-test and post-test scores of the control and experimental classes.

Table 3. Mean pre-test scores of controls and experimental classes

Mean pre-test score	
Class	**Mean Value**
Control	51,57
Experiment	53,68

From the pre-test table of the control and experimental classes, it can be obtained that the average pre-test value of the control class is 51.57 while in the experimental class it is 53.68. This value shows the initial ability of students before being given treatment.

Table 4. Mean post-test scores of controls and experimental classes

Mean post-test	
Class	**Mean Value**
Control	74,73
Experiment	82,10

From the post-test table of the control and experimental classes, it can be obtained that the average post-test value of the control class is 74.73 while in the experimental class it is 82.10. This value shows that the comprehension ability of students who use the Kahoot! technology gamification strategy is higher than the control class with conventional learning.

The results of descriptive analysis provide the results that the gamification strategy by utilizing Kahoot! technology has a positive impact on students in understanding mathematics in an interactive and interesting way. Whereas in the class given conventional learning provides an increase in the results of lower mathematical understanding. This proves that conventional learning strategies are less effective in providing in-depth understanding of mathematics.

Normality test is a statistical test used to determine whether the data that has been collected is normally distributed or taken from a normal population. The normality test aims to ensure that the data used meets the normality assumptions required in some parametric statistical tests (Ghozali, 2016). In this study, the normality test was carried out on students' pre-test and post-test data using the Shapiro-Wilk test. The Shapiro-Wilk test was chosen because it is more tept for small to medium sized samples. The results of the normality test show that students' pre-test and post-test data are normally distributed if ($p > 0.05$). This means that the normality assumption is met, making it possible to carry out further parametric statistical tests. The results of the normality test can be seen in table 5.

Table 5. Normality test results.

	Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Math Comprehen sion Result	Pre-test Experiment	.222	19	.014	.913	19	.084
	Post-test Experiment	.242	19	.005	.837	19	.004
	Pre-test control	.248	19	.003	.883	19	.024
	Post-test control	.260	19	.002	.871	19	.015

The Shapiro-Wilk test revealed that the pre-test scores for both the experimental (sig. = 0.086) and control (sig. = 0.024) groups were not normally distributed, as their significance values were below the 0.05 threshold. The same was true for the post-test scores, with the experimental group showing a significance of 0.004 and the control group a significance of 0.015. Therefore, contrary to the initial statement, the data was *not* normally distributed. Because of this non-normal distribution, the Wilcoxon test was subsequently employed to analyze the difference between pre- and post-test scores within each group.

The homogeneity test is an important part of statistical analysis, especially before conducting comparative tests such as the t-test or ANOVA. This test aims to determine whether the variances of two or more groups of data are the same or not. The assumption of homogeneity of variance must be met so that the results of the comparative tests performed are valid and reliable. If the data is not homogeneous, the use of comparative tests that assume homogeneity of variance may result in incorrect conclusions. The Homogeneity Test results can be seen in table 6.

Table 6. Homogeneity Test Table

Test of Homogeneity of Variance					
		Levene Statistic	df1	df2	Sig.
Math Comprehension Result	Based on Mean	.005	1	36	.947
	Based on Median	.073	1	36	.789
	Based on Median and with adjusted df	.073	1	35.991	.789
	Based on trimmed mean	.048	1	36	.828

Based on the table above, the Significance value (Sig.) based on the Mean is 0.947, which is greater than 0.05. This indicates that the variance of the posttest data in the experimental and control classes is equal or homogeneous.

The wilcoxon test is used as an alternative to the paired sample t-test, if the research data is not normal. The Wilcoxon test is a type of non-parametric statistical test, meaning it does not require research data to be normally distributed. This test is used to determine whether there is a difference in the mean of paired samples, particularly when the assumption of normality is not satisfied. This test does not require data to be normally distributed, so it is suitable for analyzing student learning outcomes data which often does not meet these assumptions. The Wilcoxon test results show that there is a significant difference between the pre-test and post-test scores of students after being given the Kahoot! technology gamification treatment (p < 0.05). Wilcoxon test results can be seen below.

Table 7. Tabel Ranks Uji Wilcoxon

		N	Mean Rank	Sum of Ranks
Post-test Experiment - Pre-test Experiment	Negative Ranks	0[a]	.00	.00
	Positive Ranks	17[b]	9.00	153.00
	Ties	2[c]		
	Total	19		
Post-test control - Pre-test control	Negative Ranks	0[d]	.00	.00
	Positive Ranks	16[e]	8.50	136.00
	Ties	3[f]		
	Total	19		

Based on the Wilcoxon test ranks table, it is obtained that the Negative Ranks result or the difference (negative) between the results of students' mathematical understanding for the pre-test and post-test is 0 both in the N value, mean rank, and sum of ranks. A value of 0 indicates that there is no decrease in scores from the pre-test to the post-test. In the experimental class, the table above shows 17 positive ranks (N), meaning that 17 data points reflect an improvement in students' mathematical understanding from the pre-test to the post-test. The mean rank, or average increase, is 9.00, while the sum of ranks, or total positive ranks, is 153.00. Similarly, in the control class, there are 16 positive ranks (N), indicating that 16 data points show an improvement in mathematical understanding from pre-test to post-test. The mean rank, or average increase, is 8.50, while the sum of ranks, or total positive ranks, is 136.00. Additionally, ties refer to cases where the pre-test and post-test scores remain the same. According to the table, the number of ties in the experimental class is 2, meaning that there are 2 instances where the pre-test and post-test scores are identical. While the value of ties in the control class is 3, so it can be said that the same value between the pre-test and post-test is 3. To draw conclusions from the data above can be seen in table 8.

Tabel 8. Test Statistics Wilcoxon Test

	Post-test Experiment - Pre-test Experiment	Post-test control - Pre-test control
Z	-3.739[b]	-3.640[b]
Asymp. Sig. (2-tailed)	.000	.000

The decision-making criteria based on the data above state that if the Asymp. Sig. (2-tailed) is less than 0.05, the hypothesis is accepted, whereas if it is greater than 0.05, the hypothesis is rejected. According to the statistical test table, the Asymp. Sig. (2-tailed) value is 0.00. Since 0.00 is smaller than 0.05 (0.00 < 0.05), it can be concluded that the hypothesis is accepted. This means that there is a difference between the results of students' understanding of mathematics for the pre-test and post-test, so it can also be concluded "There is an effect of kahoot technology gamification strategy on increasing mathematics understanding in grade 3 elementary school students".

The N-Gain score test is used to measure the effectiveness of the results obtained by students after being given certain treatments in the learning process. The increase in learning outcomes is measured by comparing pretest scores before treatment with posttest scores after treatment obtained by students. This N-gain test is applied to experimental classes that use Canva learning

media and control classes that do not receive this treatment. Thus, the difference in N-gain score between the two classes can illustrate the effectiveness of the treatment in improving student learning outcomes. The results of the N-gain score test can be seen in the following table 9 :

Tabel 9. Percent N-Gain Test Results

N-Gain Percent	Class	Descriptive	Statistic	Std.eror
	Experiment	Mean	67.9630	6.70002
		Min	0	
		Max	100	
	Control	Mean	51.3158	7.04642
		Min	0	
		Max	100	

Based on the results of the N-Gain score test calculation, it shows that the average value of the N-Gain score for the experimental class is 67.9630 or 67.9% including the category quite effective, while the average value of the N-Gain score for the control class is 51.3158 or 51.3% which means it is included in the less effective category. So, it can be concluded that learning math with a gamification strategy using Kahoot is quite effective compared to conventional learning in mixed number operation material.

This study was conducted with the aim of knowing the effect of using gamification strategies with the utilization of Kahoot technology on increasing mathematical understanding, especially on mixed number operation material for students in grade 3 MI Muhammadiyah Gonilan. The use of conventional learning strategies was carried out in the control class in class 3B, totaling 19 students, while learning with the Kahoot gamification strategy was carried out in the experimental class in class 3A, totaling 19 students. The total number of students in this study was 38 students. Before learning, both classes were given a pretest to determine the initial ability of students. After knowing the initial ability of both classes, then students are given learning with different approaches. Students in the control class were given treatment using conventional learning, while the experimental class was given treatment using the Kahoot gamification strategy. After being given different treatments in the control class and experimental class, at the end of the meeting after learning, both classes were given a posttest to determine the results of increasing mathematical understanding, especially on mixed number operation material.

The results of the analysis showed that the pre-test and post-test scores in the control class and experimental class were not normally distributed. This is indicated by the pre-test signification value of 0.086 and in the experimental class post-test the significance value is 0.004 while in the control class pre-test the significance value is 0.024 and the control class post-test value is 0.015, the value is smaller than 0.05 (sig. <0.05). It is said that the data is not normally distributed because the significance value is less than 0.05. Another reason the data can be abnormally distributed can also be due to the number of samples. If the sample size is too small, it is difficult to determine whether the data actually follows a normal distribution or not. Small sample distributions often appear abnormal even though the population data may be normal.

The results of students' understanding of the mixed number operations material show that, based on the average post-test scores, the control class using the conventional learning strategy obtained an average score of 74.73, while the experimental class using the Kahoot gamification strategy achieved an average score of 82.10. Based on the average results of the post-test or the final score of students that learning using the Kahoot gamification strategy has a better

difference and influence than the control class using conventional learning media. In the Wilcoxon test it is known that Asymp. Sig. (2-tailed) is 0.00. Because the value of 0.00 is smaller than 0.05 (0.00 <0.05), it can be concluded that "the hypothesis is accepted". Therefore, it can be decided that there is a difference between the results of students' understanding of mathematics for the pre-test and post-test, so it can also be concluded "There is an effect of Kahoot technology gamification strategy on increasing mathematics understanding in grade 3 elementary school students".

The difference in the results of mathematical understanding between the two classes is due to the different treatments given in the learning process. The experimental class using the Kahoot technology gamification strategy proved to provide a more significant increase compared to learning in the control class with conventional learning. From this explanation it is clear that the Kahoot gamification strategy is effective for improving mathematics understanding of mixed number operation material for students in grade 3 MI Muhammadiyah Gonilan. Based on research by (Husnawati & Carina, 2023) entitled *Gamification (Kahoot) and Its Usage in Teaching and Learning Process for Primary Education of SD / MI* shows the results that the use of Kahoot as a gamification application in SD / MI makes learning more interesting, is able to improve student learning outcomes in the domains of knowledge, attitudes, and skills, improve critical thinking skills, and concept mastery. While in research (Putra & Afrilia, 2020) entitled *Systematic Literature Review: The Use of Kahoot in Mathematics Learning* shows the results that using the Kahoot application can improve student learning outcomes, improve thinking skills, and student motivation. Research by Rizekia et al., (2022) with the title *Kahoot Application in Mathematics Learning Material Two Variable Linear Equation System* with the results that using the Kahoot application, namely game-based learning in mathematics subjects, is very good to use to make learning more fun and fun and build students' creativity in the era of technology like today.

Conclusion

From the data obtained, it can be concluded that there are differences in learning outcomes between classes using Kahoot gamification strategies and classes using conventional learning strategies. The treated class showed a significant increase compared to the untreated class, which can be seen from the average post-test value of the control class of 74.73, while the experimental class reached an average of 82.10. The normality test showed that the data was not normally distributed because the significance value of both classes was less than 0.05, so the analysis continued using the Wilcoxon nonparametric test. The Wilcoxon test results show that the Asymp. Sig (2-tailed) value of 0.00 is smaller than 0.05, which means that the hypothesis is accepted and it can be concluded that there is an effect of Kahoot technology-based gamification strategy on improving the mathematical understanding of grade 3 students. In addition, the results of the N-Gain test show that the use of this strategy is quite effective compared to conventional learning, especially in mixed arithmetic operations. The novelty in this research lies in the application of Kahoot as part of a gamification learning strategy that is designed as a whole, not just as an evaluation tool, so that it can encourage the improvement of students' understanding of mathematical concepts in a more active and fun way.

References

Alfidya Pagau, D., & Mytra, P. (2023). The Effect of Technologi in Matematics Learning. *Jurnal Penelitian Matematika Dan Pendidikan Matematika.* https://doi.org/10.30605/proximal.v5i2.2302

Alianas. (2023). *Pengaruh Media Game Edukasi Kahoot Terhadap Hasil Belajar Siswa Kelas VII SMPN Sungguminasa Kabupaten Gowa.*

Anggraeni, Y., & Sujatmiko, B. (2021). *Studi Literatur Pengaruh Penggunaan Gamifikasi dalam Pembelajaran Ilmu Komputer di Perguruan Tinggi* (Vol. 05).

Anviani, R. (2022). *Penggunaan Aplikasi Kahoot! dalam Meningkatkan Hasil Belajar Siswa.* *3*(1), 2723–8199. https://doi.org/10.21831/ep.v3i1.31746

Ariani, D. (2020). Gamifikasi untuk Pembelajaran. *Jurnal Pembelajaran Inovatif*, *3*(2), 144–149. https://doi.org/10.21009/jpi.032.09

Arikunto, S. (2013). *Prosedur Penelitian Suatu Pendekatan Praktik.* Rineka Cipta.

Azwar, S. (2013). *Metode Penelitian.* Yogyakarta: Pustaka Pelajar.

Creswell, J. W. (2014). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. *Sage Publications.*

Lovandri, D. P., Hidayat, F. N., Izzati, I. N., & Ramadhan, M. A. (2024). *Penerapan Gamifikasi untuk Meningkatkan Motivasi dan Kolaborasi pada Siswa Sekolah Dasar* (Vol. 4).

Emilio, A., Safitri, D., & Info, A. (2024). *JICN: Jurnal Intelek dan Cendikiawan Nusantara Tinjauan Pengaruh Platfrom Kahoot Terhadap Pembelajaran Interaktif Overview of The Effect of The Kahoot Platfrom on Interactive Learning. 1*(3). https://jicnusantara.com/index.php/jicn

Fazriyah, N., Saraswati, A., Permana, J., & Indriani, R. (2020). *Penggunaan Aplikasi Kahoot pada Pembelajaran Media.*

Giriansyah, F. E., Pujiastuti, H., & Ihsanudin. (2022). Kemampuan Pemahaman Matematis Siswa Berdasarkan Teori Skemp Ditinjau dari Gaya Belajar. *Jurnal Cendekia: Jurnal Pendidikan Matematika.*

Hakeu, F., Pakaya, I. I., & Tangkudung, M. (2023). Pemanfaatan Media Pembelajaran Berbasis Gamifikasi dalam Proses Pembelajaran di MIS Terpadu Al-Azhfar. *Awwaliyah: Jurnal Pendidikan Guru Madrasah Ibtidaiyah*, *6*(2), 154–166. https://doi.org/10.58518/awwaliyah.v6i2.1930

Hermawan, V., Anggiana, A. D., & Septianti, S. (2021). Analisis Kemampuan Pemahaman Matematis Melalui Model Pembelajaran Student Achievemen Divisions (STAD). *Pasundan Journal of Research in Mathematics Learning and Education.*

Husnawati, Z., & Carina, A. (2023). *Gamification (Kahoot) and Its Usage in Teaching and Learning Process for Primary Education of SD/MI* (Vol. 6, Issue 3). www.kahoot.com

Jusuf, H. (2016). Penggunaan Gamifikasi dalam Proses Pembelajaran. In *Jurnal TICOM* (Vol. 5, Issue 1).

Maulida, B. A., Albahij, A., & Mufidah, L. (2024). *Pengaruh Penggunaan Teknologi TPACK dalam Meningkatkan Minat Belajar Matematika Peserta Didik SD Kelas 4*.

Nakiyemba, S. (2024). Impact of Gamification on Knowledge Acquisition. In *European Journal of Information and Journal Management ISSN* (Vol. 3, Issue 1). www.carijournals.org

Nuraeni, Mulyati, E. S., & Maya, R. (2018). Analisis Kemampuan Pemahaman Matematis dan Tingkat Kepercayaan Diri Pada Siswa MTs. *Jurnal Pembelajaran Matematika Inovatif*.

Puspitasari, R., Suparman, S., & Fahrunnisa, F. (2023). Pengaruh Media Pembelajaran Kahoot Berbasis Game Based Learning terhadap Minat dan Hasil Belajar Peserta Didik. *Edukatif: Jurnal Ilmu Pendidikan*, *4*(6). https://doi.org/10.31004/edukatif.v4i6.4382

Putra, A., & Afrilia, K. (2020). Systematic Literature Review: Penggunaan Kahoot pada Pembelajaran Matematika. *Jurnal Ilmiah Pendidikan Matematika Al-Qalasadi*, *4*(2), 110–122.

Putrawangsa, S., & Hasanah, U. (2018). Integrasi Teknologi Digital dalam Pembelajaran di Era Industri 4.0 Kajian dari Perspektif Pembelajaran Matematika. *Jurnal Tatsqif: Jurnal Pemikiran Dan Penelitian Pendidikan*, *16*(1).

Rizekia, S., Assegaf, Z., Susanti, W., Esi, N., & Yani, A. (2022). Aplikasi Kahoot pada Pembelajaran Matematika Materi Sistem Persamaan Linear Dua Variabel. *Adiba: Journal of Education*, *2*, 507–516.

Shofiah, N. F., Purwaningrum, J. P., & Fakhriyah, F. (2021). Kemampuan Pemahaman Konsep Matematis Siswa Sekolah Dasar melalui Pembelajaran Daring Dengan Aplikasi Whatsapp. *Edukatif: Jurnal Ilmu Pendidikan*, *3*(5). https://doi.org/10.31004/edukatif.v3i5.907

Slamet, R., & Wahyuningsih, S. (2022). *Validitas dan Reliablitas terhadap Instrumen Kepuasan Kerja*.

Sugiyono. (2018). Metode Penelitian Kuantitatif, Kualitatif, dan R&D. *Bandung: Alfabeta*.

Sugiyono. (2019). *Metode penelitian kuantitatif kualitatif dan R dan D* (Ed 2; Cet.1). Alfabeta.

Sulistiyawati, W., Sholikhin, R., Septi Nur Afifah, D., & Listiawan, T. (2021). Peranan Game Edukasi Kahoot! Dalam Menunjang Pembelajaran Matematika. *Jurnal Matematika*, *15*(1).