

The Effect of Fun Trio Games on Class V Elementary School Numeracy Ability

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Abstract

This study is conducted in response to low numeracy achievement observed in the Minimum Competency Assessment (*Asesmen Kompetensi Minimum/AKM*) pretest, which shows an average score of 43.16%, indicating insufficient mastery of basic numeracy skills among students. The purpose of this research is to examine changes in numeracy abilities following the implementation of the Fun Trio Game, consisting of three interactive learning tools: Diabox, Snake Ladder, and Wordwall, among fifth-grade students at SDN Tambakrejo. The study employs a quantitative approach using a one-group pretest-posttest pre-experimental design without a control group. The participants consist of 30 students, and data are collected through a 20-item multiple-choice numeracy test administered before and after the intervention. The findings show a notable improvement in students' numeracy performance after the Fun Trio Game. The average score increases from 43.16% in the pretest to 70.16% in the posttest, resulting in an N-Gain value of 0.47, indicating a moderate level of improvement. Statistical analysis also reveals a significant difference between pretest and posttest scores ($p < 0.05$), supporting the alternative hypothesis that the intervention positively affects numeracy performance. Despite these encouraging results, the findings should be interpreted with caution due to the absence of a control group, which limits the ability to make strong causal inferences. In conclusion, the study suggests that the Fun Trio Game is associated with improved numeracy abilities among fifth-grade students. Further research employing more rigorous experimental designs is recommended to validate these findings and assess the generalizability of the intervention to broader educational contexts.

Keywords: numeracy, fun trio game, diabox, wordwall, learning media

INTRODUCTION

Numeracy is a fundamental competency that must be developed from the elementary school level. This is because numeracy equips students with the ability to apply mathematical concepts, procedures, and reasoning to solve problems encountered in everyday life across various contexts (Pusat Asesmen dan Pembelajaran, et al., 2020). Numeracy is a fundamental competency that must be developed from the elementary school level, as it equips students with the ability to apply mathematical concepts, procedures, and reasoning to solve problems encountered in everyday life across various contexts (Pusat Asesmen dan Pembelajaran, et al., 2020). Numeracy goes beyond basic computational skills and includes the ability to understand, interpret, and apply mathematical information meaningfully in real-life situations. In Indonesia, numeracy has become a national educational priority and is formally assessed through the *Asesmen Kompetensi Minimum* (AKM), which measures students' basic competencies in reading literacy and mathematical literacy (numeracy) as part of the *Asesmen Nasional* implemented since 2021. AKM functions to measure the basic abilities that must be possessed by each student in order to fulfill their potential and make a constructive contribution to communal life. In the implementation of AKM, there are two main competencies that are measured, namely reading literacy and mathematical literacy or numeracy (Irwandi et al., 2021).

Despite these policy efforts, students' numeracy achievement at the elementary level remains relatively low. This condition is closely related to broader literacy challenges in Indonesia, where national reports indicate limited reading engagement among students (Pamungkas et al., 2023). In response, the government introduced programs under the *Merdeka Belajar Kampus Merdeka* framework to strengthen literacy and numeracy from early education stages (Arung et al., 2023). Mastery of numeracy literacy from an early age is an important foundation in shaping students' intelligence and independence, both of which are needed to face various challenges in the future (Iasha et al., 2024). Supporting facilities and training for teachers related to the implementation of AKM must also be provided immediately (Meriana et al., 2021).

At the classroom level, low numeracy achievement is often associated with instructional practices that remain teacher-centered. Observations at SDN Tambakrejo revealed that mathematics instruction was predominantly delivered through lectures, with limited opportunities for active student engagement. Question-and-answer activities involved only a small number of students, resulting in uneven participation. Such conventional learning models position students as passive recipients of information, thereby restricting the development of logical reasoning, critical thinking, creativity, and collaborative skills. The learning model that focuses on the method of delivering material is dominated by the active role of the teacher, while students only listen and pay attention so that their involvement in relatively passive learning activities is called the conventional learning model (Asmedy, 2021). Consequently, students experience difficulties in key numeracy skills, such as interpreting diagrams, performing meaningful calculations, and solving contextual mathematical problems. Learning with conventional models tends to be oriented towards the role of teachers as the center of activities, so students have limited space to develop logical, critical, and creative thinking skills, as well as cooperative skills. Teacher-centered approaches, such as unstructured lectures and discussions, often fail to stimulate students' cognition (Putri & Sari, 2025).

The problem addressed in this study is the low level of numeracy skills among Grade V students at SD Negeri Tambakrejo. This condition was identified through the results of the AKM pretest, which showed an average numeracy score of 43.16%. Based on these statistical data, the numeracy ability of Grade V students at SD Negeri

Tambakrejo can be categorized as low, indicating the need for targeted efforts to address this issue. Numeracy is one of the fundamental skills that every student must possess, as many daily life activities rely on numeracy competence. Moreover, numeracy serves as a foundational skill for understanding more advanced fields of knowledge (Yohanah et al., 2024). Therefore, efforts are required to improve students' numeracy skills through systematic numeracy habituation activities, both inside and outside the classroom. To enhance students' learning interest, particularly in the development of numeracy skills, teachers need to design learning experiences that are engaging, enjoyable, and student-centered. Through professional development and training activities, teachers' creativity can be further developed, enabling the implementation of more innovative and varied instructional practices in the classroom.

To address these challenges, instructional improvement through the use of effective and engaging learning media is required. Learning media serve as intermediaries that facilitate the delivery of instructional content and enhance students' conceptual understanding by creating more interactive and meaningful learning experiences. One of the functions of learning media is as an intermediary in conveying messages or learning materials from teachers to students, so that the process of conveying information can take place effectively and help increase students' understanding of the material taught (Anjarini et al., 2022). In this study, a game-based learning approach known as the Fun Trio Game is implemented. This approach integrates three numeracy learning media: Diabox, Snake Ladder, and Wordwall. Diabox is a physical medium designed to support students' understanding of data representation through bar and line diagrams. Snake Ladder is adapted as a numeracy game to increase learning motivation, while Wordwall is a web-based digital platform that provides interactive exercises to support numeracy learning in an engaging manner. This wordwall media is a flexible, interesting, and innovative web-based digital learning media for various materials (Ma'rifah et al., 2024). In this wordwall, there are various menu options for interactive game displays, which are certainly very helpful in improving numeracy by building an active, interesting, and interactive learning atmosphere in the classroom (Nenohai et al., 2021).

Previous studies have reported positive effects of individual learning media on students' numeracy or mathematics achievement. For example, Rahmadia and Ain (2024) demonstrated that diagram-based media significantly improved fifth-grade students' numeracy skills, while Nadia & Desyandri (2022) found that digital learning media positively influenced students' learning outcomes. However, most existing studies have examined single media in isolation, without integrating multiple game-based media into a unified instructional approach. This indicates a research gap concerning the combined use of physical and digital game-based media in elementary numeracy learning.

The novelty of this study lies in the integration of three distinct game-based learning media both physical and digital within a single, coherent numeracy learning approach through the Fun Trio Game. This integrated design is intended to create an active, contextual, and engaging learning environment that aligns with the developmental characteristics of fifth-grade students. The combination of digital and non-digital media makes Fun Trio Game flexible and applicative, and different from previous research which generally uses one type of game separately.

Therefore, this study aims to examine the implementation of the Fun Trio Game in elementary numeracy learning and its association with improvements in fifth-grade students' numeracy abilities, particularly in understanding diagrams, performing mathematical calculations, and solving contextual numeracy problems assessed within the AKM framework.

METHOD

This study employed a quantitative approach using a pre-experimental research design, specifically the one-group pretest–posttest design. This design was used to examine changes in students' numeracy abilities before and after the implementation of the Fun Trio Game, without the inclusion of a control group. The research procedure was conducted in three sequential stages: pretesting, treatment implementation, and posttesting (Nari et al., 2020). The first stage involved administering a pretest to measure students' initial numeracy abilities prior to the intervention. The second stage consisted of implementing the Fun Trio Game as the learning treatment. The third stage involved administering a posttest to measure changes in numeracy performance after the intervention. In accordance with (Sugiyono, 2023), an increase in posttest scores compared to pretest scores indicates a positive improvement following the treatment. However, because this design involved only one experimental group without a control group, the findings are limited to observed improvements rather than strong causal conclusions. The population of this study consisted of all fifth-grade students at SDN Tambakrejo in the 2024/2025 academic year. The sample included 30 students (15 male and 15 female), selected using total sampling, as the entire population met the research criteria. The selection of Grade V students was based on the consideration that the implementation of the AKM within the *Kampus Mengajar* program is conducted at this grade level.

Data were collected using test methods in the form of a pretest and posttest. Both tests were administered at school using Chromebooks through a digital application containing the test items. The instrument consisted of 20 numeracy questions adapted from the *Asesmen Kompetensi Minimum* (AKM). The AKM instrument was selected because it was developed and standardized by an authorized institution and is aligned with nationally defined numeracy competencies, including understanding diagrams, performing calculations, and solving contextual problems. Therefore, although no additional empirical validity and reliability testing was conducted in this study, the standardized nature of the AKM supports its content and construct validity as a numeracy measurement tool. Data analysis was conducted using descriptive and inferential statistical techniques. Descriptive statistics were used to compare pretest and posttest scores. Prior to hypothesis testing, a normality test was conducted and indicated that the data were not normally distributed. Accordingly, a non-parametric statistical test was applied. The Wilcoxon Signed Rank Test was used to compare paired pretest and posttest scores, as it is appropriate for non-normally distributed data and pre-experimental designs involving related samples (Sugiyono, 2023). The results of this analysis indicate statistically significant differences between pretest and posttest scores, reflecting observed improvements in students' numeracy abilities following the intervention, while acknowledging the methodological limitations of the research design.

FINDINGS AND DISCUSSION

Findings

A comparison of the pre-test and post-test results of the fifth grade students of Tambakrejo Elementary School can be seen in the following diagram. The pre-test and post-test comparison diagram shows that the post-test scores were higher than the pre-test scores after the treatment. This indicates that the Fun Trio Game has a positive impact on student learning.

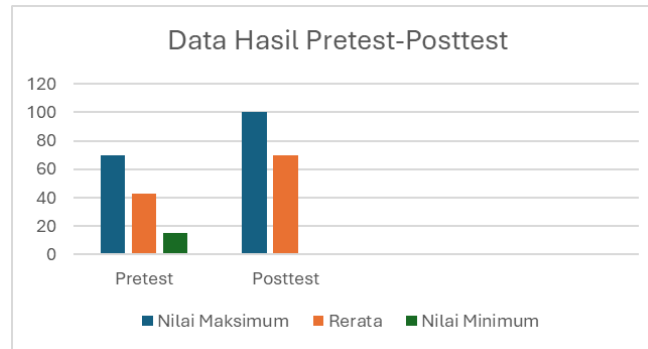


Figure 1. Pretest-Posttest Result Data

Table 1. Summary of Student Scores

Aspects	Value
Maximum Pre-test Value	70
Minimum Pre-test Score	15
Maximum Post-test Score	100
Post-test Minimum Score	0
Rerata Pre-test	43.16
Rerata Post-test	70.16
Rerata N-Gain	0.47

Based on the results of the pretest and posttest that have been carried out, information was obtained from Table 1 that students' numeracy skills before the implementation of the Fun Trio Game numeracy (Pretest) obtained an average score of 43.16 while after the implementation of the Fun Trio Game numeracy (Posttest) increased and obtained an average score of 70.16 after students participated in a series of numeracy programs given by the *Kampus Mengajar* Batch 7 team at SD N Tambakrejo. The magnitude of this increase can be seen from the average N-Gain value which reached 0.47. This score shows that the *Kampus Mengajar 7* program at SDN Tambakrejo is able to have a positive impact on improving student learning outcomes. This conclusion refers to the N-Gain category proposed by Meltzer, as shown in the following table (Rumahombar, 2024).

$$N\ Gain = \frac{Posttest\ Score - Pretest\ Score}{Ideal\ Score - Pretest\ Score}$$

Description:

Pretest score = score obtained before intervention or treatment

Posttest score = score obtained after intervention or treatment

Ideal score = maximum score that can be obtained during the test

The N-Gain score scoring criteria can be seen in the following table.

Table 2. N-Gain Score Criteria

Limitations	Category	Remarks
$g > 0.7$	Height	Greatly Improved
$0.3 \leq g \leq 0.7$	Medium	Increase
$g < 0.3$	Low	Not Increasing

The normality test is an analytical procedure that aims to ascertain whether the research data has a distribution pattern that is close to the normal distribution. Although this stage may seem simple, normality tests have an essential role in quantitative research, especially when researchers plan to use parametric statistical analysis methods that require data to be normally distributed. Thus, the normality test is an important first step to determine the feasibility of the analysis technique to be used (Isnaini et al., 2025) If the significance value is more than 0.05, the data is deemed to be regularly distributed. Thirty students served as the study's sample size. The Shapiro-Wilk test and the Kolmogorov-Smirnov test are two frequently used normality tests. Given that the number of samples is less than 50, the normality test used in this study is the Shapiro-Wilk test. The results of the normality test of students' numeracy ability at SDN Tambakrejo are presented as follows.

Table 3. Numeracy Normality Test

Shapiro Wilk			
	Statistics	df	Sig.
Pre-test	0.947	30	0.144
Post-test	0.877	30	0.002

According to Table 3, the Shapiro-Wilk normality test findings indicate that the pretest data's significance value is 0.144. It is possible to conclude that the pretest data is normally distributed because the value is bigger than 0.05. Nevertheless, a significant value of 0.002, which is less than 0.05, was found in the posttest data. This suggests that the posttest data does not follow a normal distribution. The Wilcoxon Signed Ranks Test, a nonparametric method appropriate for paired data with anomalous distributions, is used in this study's data analysis.

Tabel 4. Wilcoxon Signed Rank Test Ranks

Posttest-Pretest	N	Mean Rank	Sum of Ranks
Negative Ranks	3 ^a	4.83	14.50
Positive Ranks	27 ^b	16.69	450.50
Ties	0 ^c		
Total	30		

- a. Posttest < Pretest
- b. Posttest > Pretest
- c. Posttest = Pretest

Based on Table 4 above, two paired samples of pretest and posttest scores were compared using the non-parametric Wilcoxon Signed Rank Test to see if there was a significant difference between the two. The Wilcoxon test is usually used when the data is not regularly distributed or on an ordinal scale. The test results showed that out of a total of 30 respondents, there were 3 respondents who experienced a decrease in scores (Negative Ranks) with an average score of 4.83 with a total rating (Sum of Ranks) of 14.50. Meanwhile, there were 27 respondents who had posttest scores higher than the pretest scores (Positive Ranks) with an average of 16.69 and a number of ratings (Sum of Ranks) of 450.50. The Ties value is 0, which indicates that none of the respondents have the same score between the pretest and posttest. Overall, the total data analyzed was 30 respondents. The comparison of the Sum of Ranks values shows a very significant difference, where the total positive rating (450.50) is much greater than the total negative rating (14.50). This indicates that the overall direction of the score change is moving in a more positive direction. This means that the treatment provided in this study has an impact on increasing scores for the vast majority of research subjects, which is 90% of

the total sample. The data shows that the number of respondents who experienced an increase in scores was 27 respondents, so it was much more dominant than those who experienced a decrease. Substantially, these results show that the use of Fun Trio Game media has proven to be effective in increasing the numeracy of grade V students of SDN Tambakrejo.

Table 5. Test Statistics Posttest-Pretest

Z	-4.497b
Asymp. Sig. (2-tailed)	<.001

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

A Z value of -4.497 with an Asymp significance value was produced based on the outcomes of hypothesis testing using the Wilcoxon Signed Rank Test mentioned in the Test Statistics table. Sig. (2-tailed) < 0.001 . The alternative hypothesis (H_a) is accepted and the null hypothesis (H_0) is rejected since the significance value is less than the significance threshold (α) of 0.05 ($0.001 < 0.05$). As a result, it can be statistically stated that there is a substantial difference between the pretest and posttest results, indicating that using Fun Trio Game media significantly improves students' numeracy abilities.

Discussion

The results of this study indicate a positive trend in fifth-grade students' numeracy performance following the implementation of the Fun Trio Game. From a theoretical perspective, these findings can be understood through constructivist and social learning theories, which emphasize that learning occurs actively through interaction, experience, and reflection. Game-based learning environments provide meaningful contexts in which students engage cognitively, socially, and emotionally with mathematical concepts, thereby supporting deeper numeracy development. The media used in the Fun Trio Game diabox, snake ladder, and wordwall are able to stimulate students' cognitive aspects through visualization, interactive activities, and repetitive question practice. This supports the opinion that varied and innovative learning media can increase students' motivation and conceptual understanding, especially in mathematics learning.

In particular, diabox media contributes to improving students' understanding of the concept of bars, circles, and line diagrams through concrete visual representations. The snake and ladder media provides a fun game-based learning experience, so that students are more enthusiastic in solving problems collaboratively. Meanwhile, Wordwall as an interactive digital media allows students to practice questions independently with an attractive display, increase thinking speed, and strengthen basic numeracy understanding. Students' numeracy outcomes are significantly impacted by the utilization of Wordwall learning resources. This rise supports the idea that game-based learning can produce an engaging, engaging learning environment and encourage overall student participation. Numeracy skills in elementary school students are not only influenced by the understanding of mathematical concepts, but also by the way students organize knowledge and the level of epistemological awareness in applying it to solve contextual problems. Students who have high numeracy generally show conceptual and reflective reasoning skills, which shows the existence of a systematic knowledge structure and awareness of the thought process they carry out (Pangestika et al., 2025).

The Fun Trio Game implementation program was designed and developed with *Kampus Mengajar* students through collaboration with teachers at SD Negeri Tambakrejo for a four-month assignment period. In the first activity, one of the media used in this program is Diabox, which is a teaching tool that contains material on bar diagrams, pie charts, and line diagrams. This media is used directly in classroom learning so that

students can practice the concept of numeracy in a concrete way. This media is used in the classroom every mathematics subject takes place. This diabox media is designed to increase student engagement and strengthen conceptual understanding through the real practice of using the diabox so as to create an active and fun learning atmosphere. It has been demonstrated that using Diabox as a dynamic, interactive, game-based learning tool significantly improves students' numeracy abilities. The disparity between the pretest and posttest results of the AKM that has been used demonstrates this. This study's findings align with Rahmadia & Ain's (2024) study, which found that grade V students' numeracy skills were significantly impacted by the use of diagram board media (PADI) at SDN 159 Pekanbaru.

The second activity is the use of snakes and ladders as a learning medium both inside and outside of the classroom, especially in improving the numeracy of grade V students. This game presents an element of entertainment as well as interaction through the movement of pawns according to the numbers obtained from the roll of the dice (Wadud & Lailiyah, 2024). This snake ladder is designed and adapted to be flexible for use in various subjects. The purpose of this snake and ladder media is to facilitate, add experience and increase students' interest in learning mathematics material, especially in numeracy materials (Yustitia et al., 2024). This snake and ladder media has proven to be very effective in improving students' numeracy skills because this media is dynamic and flexible because it can be adjusted to the material or subject used so that it makes it easier to use. The results of this study are consistent with the findings of the research conducted by Yustitia et al. (2024) at SDN Sugihrejo which discussed the use of snake and ladder media to improve AKM results and was proven to improve numeracy AKM results.

The third activity is the use of digital media using wordwalls. Wordwall is a web-based learning media presented in the form of a digital application, which allows educators to design and develop various forms of learning activities in it (Ma'rifah et al., 2024). This application has the advantage of choosing interactive quiz templates that resemble games, so that it is able to attract students' attention. Wordwalls can increase students' enthusiasm and interest in studying while also making the learning process more participatory (Nadia & Desyandri, 2022). The Wordwall application provides various types of quiz templates, such as multiple-choice questions (quizzes), crossword puzzles (crossword), activities of sorting or matching cards (matching pairs), as well as exercises to match pictures with the right answers (find the match), and other forms of educational games. The variety of templates allows Wordwall to be used as an effective evaluation instrument in the learning process. This is in accordance with the opinion of Nadia & Desyandri (2022) that research that has been conducted at SDN 14 Simpangampek examines the influence of the use of Wordwall learning media on the learning outcomes of grade V students. Using visual media in the form of images, animations, and interactive simulations, students can understand mathematical concepts through hands-on experience, which has an impact on increasing understanding (Khoirunisa et al., 2023).

Based on various previous studies, it might conclude that educational media, both digital and physical games, have been proven to have a notable impact on raising maths learning results, literacy, and numeracy of elementary school students. Media such as Wordwall, snake ladder, and Diagram Board (PADI) can increase learning motivation and help students understand numeracy concepts more easily and fun. The Fun Trio Game implementation program was designed and developed with *Kampus Mengajar* students through collaboration with teachers at SD Negeri Tambakrejo for a four-month assignment period. The application of innovative media and learning methods allows students to follow a more interesting and enjoyable learning process, thereby increasing their motivation in learning (Nafi'ah et al., 2025). The role of teachers is also very

important in the successful implementation of media programs, for example in directing group learning, regulating the dynamics of interaction between students, and ensuring that all students actively contribute. The level of student participation greatly determines the effectiveness of the cooperative learning model, so the more enthusiastic and involved students are, the greater the benefits obtained (Syahirah, 2025).

The integration of Diabox, Snake Ladder, and Wordwall within the Fun Trio Game creates a multisensory and student-centered learning experience that addresses different dimensions of numeracy development. Visual understanding (Diabox), collaborative reasoning (Snake Ladder), and individual practice with feedback (Wordwall) work synergistically to support students' abilities to interpret diagrams, perform calculations, and solve contextual numeracy problems. This integrated approach extends earlier research that primarily examined single learning media in isolation and highlights the potential benefits of combining physical and digital game-based tools in elementary numeracy instruction. Nevertheless, the interpretation of these findings must consider the limitations of the research design. The use of a pre-experimental one-group pretest-posttest design without a control group limits the ability to establish causal relationships between the intervention and the observed improvements. In addition, the relatively small sample size and the four-month implementation period during the *Kampus Mengajar* program suggest that external factors such as student motivation, classroom conditions, and teacher facilitation may also have contributed to the increase in numeracy scores. Therefore, the results should be interpreted as indicating an association or positive trend in numeracy performance following the intervention, rather than definitive evidence that the Fun Trio Game alone caused the improvement.

In conclusion, this study provides empirical evidence that an integrated game-based learning approach has the potential to support numeracy development in elementary school students. While the findings suggest that the Fun Trio Game is a promising strategy for enhancing numeracy learning, further research employing stronger experimental designs, control groups, and larger samples is recommended to confirm its effectiveness and strengthen the generalizability of the results.

CONCLUSION

This study indicates that the implementation of the Fun Trio Game integrating Diabox, Snake Ladder, and Wordwall was associated with improvements in Grade V students' numeracy skills at SDN Tambakrejo. The findings suggest a positive trend in students' ability to understand diagrams, perform calculations, and solve contextual numeracy problems after participating in game-based learning activities. By combining visual, physical, and digital media, the Fun Trio Game created a more engaging and student-centered learning environment compared to conventional instruction. The main contribution of this study lies in demonstrating the potential of an integrated game-based learning approach that blends multiple media formats to support elementary numeracy learning within the framework of the *Kurikulum Merdeka*. Practically, these results imply that teachers can utilize interactive and game-based media to increase student engagement, encourage active participation, and support meaningful numeracy practice aligned with AKM-oriented learning objectives. However, the conclusions should be interpreted with caution due to the pre-experimental one-group pretest posttest design and the absence of a control group. The observed improvements reflect learning trends following the intervention rather than definitive causal effects. Future studies are therefore recommended to employ stronger experimental designs involving control groups, larger samples, and broader classroom or school contexts. Further research may also explore the integration of the Fun Trio Game into routine numeracy habituation or formative

assessment activities to examine the sustainability of its impact over time, particularly within programs such as *Merdeka Belajar* and *Kampus Mengajar*.

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