

Implementing the Morning Jarimatika Game as a Finger-Based Numeracy Strategy: A Study at SD 77 Penerokan

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Article Information

Received: May 25, 2026

Revised: June 23, 2026

Online: July 06, 2026

Keywords

Morning Jarimatika Game,
Numeracy Skills, Elementary
Student

ABSTRACT

This study investigates the effectiveness of the Morning Jarimatika Game as a finger-based instructional strategy to improve elementary students' numeracy skills. Numeracy is essential for solving everyday mathematical problems; however, the structured use of Jarimatika as a daily learning activity remains underexplored, which highlights the novelty of this study. A quantitative approach with a one-group pretest-posttest design was employed, involving 25 students at SD 77 Penerokan. Data were analyzed using descriptive and inferential statistics, including normality, homogeneity, and t-tests, as well as N-gain and effect size calculations. The results show a significant improvement in numeracy skills, with mean scores increasing from 63.20 to 86.00. The data were normally distributed and homogeneous, and the t-test indicated a significant difference (Sig. < 0.001). The effect size was large (Cohen's $d = 2.752$), with a moderate N-gain (62.27%). These findings suggest that the Morning Jarimatika Game is an effective numeracy-based instructional strategy that can be applied as a classroom warm-up activity. Future research should include control groups, larger samples, and long-term implementation across diverse educational contexts.

Keywords: Morning Jarimatika Game, Numeracy Skills, Elementary Student

INTRODUCTION

Numeracy is one of the essential competencies in elementary education. It encompasses not only basic counting skills but also the ability to apply mathematical concepts, interpret quantitative information, and solve problems in real-life contexts. According to OECD (2023), mathematical literacy involves the capacity to reason mathematically and to formulate, apply, and interpret mathematics in various situations. Therefore, numeracy should be understood as a fundamental skill that supports students' learning across disciplines and in everyday life.

At the elementary level, numeracy plays a crucial role in building students' mathematical foundations. Students with strong numeracy skills tend to demonstrate better problem-solving abilities, mathematical reasoning, and understanding of more complex concepts. Conversely, students who struggle with basic numeracy often encounter difficulties in topics such as arithmetic

operations, fractions, measurement, and contextual problem-solving. Classroom observations indicate that many students still experience challenges, including low confidence, slow calculation skills, and limited understanding of number concepts. These difficulties are often associated with instructional practices that emphasize procedural learning rather than meaningful and concrete experiences.

One instructional approach that can address these challenges is the Jarimatika method, a finger-based counting strategy that utilizes physical representation to support mathematical understanding. This approach aligns with the characteristics of elementary students, who benefit from concrete and kinesthetic learning experiences. Previous studies have shown that finger-based strategies can improve students' arithmetic skills and numeracy development (Frey et al., 2024). In addition, game-based learning has been widely recognized as an effective approach to increase students' engagement and motivation. A systematic review by Russo et al. (2024) indicates that non-digital mathematics games can positively influence students' mathematical achievement and attitudes. Furthermore, Debrenti (2024) highlights that games and manipulatives help students construct and connect mathematical concepts more effectively.

Building on these approaches, the Morning Jarimatika Game integrates the Jarimatika method with game-based learning in a structured classroom routine. This activity is implemented as a daily numeracy warm-up before formal instruction begins. Through short, repetitive, and interactive exercises, students engage in finger-based counting, participate in challenges, and practice both individually and collaboratively. Such routine-based activities are expected to improve students' fluency, readiness to learn, and overall engagement in mathematics.

Previous studies have demonstrated that the use of Jarimatika can significantly improve students' numeracy skills. For example, the implementation of Jarimatika in the Teaching Campus Program increased students' numeracy literacy scores significantly (Jumadiyah & Zumrotun, 2024). Similarly, research by Yohanah et al. (2024) found significant differences between pretest and posttest scores using the Jarimatika Morning Game. Other studies using quasi-experimental designs also report improved numeracy outcomes in classes applying Jarimatika compared to control groups.

However, although prior research has established the effectiveness of Jarimatika as a counting method and instructional strategy, most studies have focused on its use as a technique rather than as a structured, routine-based pedagogical intervention. There is still limited evidence regarding how Jarimatika functions when systematically integrated into daily classroom practices, particularly as a consistent morning activity that combines repetition, engagement, and game-based learning. Moreover, research examining this approach in specific local contexts, such as SD 77 Penerokan, remains scarce.

This study addresses these gaps by investigating the implementation of the Morning Jarimatika Game as a structured daily instructional strategy. Specifically, this research examines how the integration of finger-based and game-based learning within a routine classroom setting influences students' numeracy skills. The novelty of this study lies in positioning Jarimatika not merely as a computational technique, but as a pedagogical intervention embedded in daily learning routines. Accordingly, the research question of this study is: To what extent does the Morning Jarimatika Game influence students' numeracy skills at SD 77 Penerokan? The purpose of this study is to evaluate the effectiveness of this instructional strategy in improving students' numeracy skills.



The findings of this study are expected to contribute to the fields of Learning and Teaching and Educational Effectiveness by providing empirical evidence on how simple, low-cost, and engaging instructional practices can be systematically implemented to support numeracy development. In addition, this study offers practical implications for teachers in designing interactive, routine-based, and student-centered numeracy instruction that aligns with the needs of elementary school learners.

METHODS

This study employed a quantitative approach using a pre-experimental design with a one-group pretest-posttest model. This design was selected to examine changes in students' numeracy skills before and after the implementation of the Morning Jarimatika Game. The population of this study consisted of students at SD 77 Penerokan, with 25 students selected as research participants. All participants completed both the pretest and posttest. The pretest was administered to measure students' initial numeracy skills, while the posttest was conducted after the intervention to assess changes following the implementation of the Morning Jarimatika Game.

Data were collected through tests and observation. The numeracy test consisted of 10 items with a maximum score of 100, designed to measure students' numeracy skills. The test items were developed based on several numeracy indicators, including: (1) understanding numbers and number representation, (2) performing basic arithmetic operations, (3) applying counting strategies, and (4) solving simple contextual mathematical problems. A test blueprint was constructed to ensure alignment between indicators, item distribution, and levels of difficulty. Observation was conducted to document the learning process during the implementation of the intervention.

The validity of the instrument was established through expert judgment involving two validators, who evaluated the items based on content relevance, clarity of language, level of difficulty, and alignment with numeracy indicators. The validation results indicated that the instrument was appropriate for use with minor revisions. The reliability of the instrument was assessed using Cronbach's Alpha, yielding a coefficient of 0.75, which indicates acceptable internal consistency.

Data analysis was conducted using both descriptive and inferential statistics. Descriptive statistics included the calculation of mean, standard deviation, and standard error. Prior to hypothesis testing, the assumption of normality was examined using the Shapiro-Wilk test. To determine whether there was a significant difference between pretest and posttest scores, a paired sample t-test was employed, as the data were obtained from the same group of participants. Furthermore, N-gain analysis was used to measure the level of improvement in students' numeracy skills, while effect size (Cohen's *d*) was calculated to determine the magnitude of the intervention's impact. Ethical considerations were also taken into account in this study. Permission to conduct the research was obtained from the school, and participants were informed about the purpose of the study. Their participation was voluntary, and confidentiality of the data was maintained throughout the research process.

Table 1. One-group pretest-posttest research design

Group	Pretest	Treatment	Posttest
Experimental	O1	X	O2

Source: (Sugiyono, 2013)

Description:

- O1: Pretest before the treatment
 O2: Posttest after the treatment
 X: Treatment using the Morning Jarimatika Game

RESULTS

The Morning Jarimatika Game improved pupils' numeracy abilities at SD 77 Penerokan, according to the study's findings. The gap between students' pretest and posttest scores illustrates the effect. The pretest was administered prior to students receiving the treatment, and the posttest was administered following their participation in the Morning Jarimatika Game. At the start of the school day, a brief and repetitive finger-based counting exercise was used as the treatment. The pretest's mean score was 63.20, with a standard deviation of 7.89 and a standard error of 1.58, according to the descriptive statistics. Following the intervention, the posttest mean score rose to 86.00, with a standard error of 1.73 and a standard deviation of 8.66. The pretest and posttest results differed by an average of 22.80 points. This outcome demonstrates that after using the Morning Jarimatika Game to learn, pupils' numeracy performance improved.

Table 2. Descriptive Statistics of Pretest and Posttest Scores

Test	N	Average Score	Standard Deviation	Standard Error
Pretest	25	63,20	7,89	1,58
Posttest	25	86,00	8,66	1,73

Students' numeracy skills have clearly improved, according to the descriptive statistics. Students' initial numeracy skills still needed to be improved, according to the pretest results. Students' posttest scores significantly improved after they participated in the Morning Jarimatika Game. According to this research, finger-based counting exercises can improve students' comprehension of numbers, their ability to carry out simple arithmetic operations, and their ability to complete fundamental numeracy tasks.

The data were examined for homogeneity and normality prior to hypothesis testing. Because there were 25 students, the Shapiro-Wilk test was used for the normalcy test. According to the results, the pretest's Shapiro-Wilk significance value was 0.05, while the posttest's significance value was 0.06. At the 0.05 significance level, both values satisfied the normalcy assumption. As a result, the data from the pretest and posttest had a normal distribution.

Table 3. Shapiro-Wilk Normality Test Results

Test	Shapiro-Wilk Statistic	Sig.	Description
Pretest	0,92	0,05	Normal
Posttest	0,92	0,06	Normal

Table 4. Independent Samples t-test Result

Test	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval
Equal variances assumed	-9,73	48	< 0,01	-22,80	-27,51 to -18,09



Equal variances -9,73 47,59 < 0,01 -22,80 -27,51 to -18,09
not assumed

The treatment did not have a deleterious impact, despite the negative t-value. Because SPSS computed the difference by deducting the posttest score from the pretest score, the value was displayed. The mean difference turned negative since the posttest score was higher than the pretest score. Significantly, this outcome demonstrates that following the treatment, pupils' numeracy abilities improved. The t-test result sig < 0,01 was the result of independent samples t-test result.

Table 6. ANOVA Result

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6498,00	1	6498,00	94,69	< 0,01

N-gain was also used to examine how pupils' numeracy skills improved. The average N-gain score was 62.27%, or 0.62. This outcome falls into the moderate range. N-gain scores ranged from a minimum of 0.25 to a maximum of 1.00.

Table 7. N-Gain Result

	N	Minimum	Maximum	Mean	Std. Deviation
NGain_Score	25	.25	1.00	.6227	.22978
NGain_Persen	25	25.00	100.00	62.2651	22.97755
Valid N (listwise)	25				

These results demonstrate that while students' development varied, the aggregate gain was significant. The treatment had a significant impact on pupils' numeracy abilities, according to the effect size study. Hedges' adjustment was 2,71, Glass's delta was 2,63, and Cohen's d was 2,75. These numbers show a significant impact. This indicates that the improvement in pupils' numeracy abilities was both practically and statistically significant during the learning period.

The quantitative results were corroborated by the observation results. Students participated actively in the Morning Jarimatika Game. They cooperated in group activities, mimicked finger movements, responded to counting problems, and listened to the teacher's example. After engaging in the activity multiple times, some students who had been apprehensive at first gained confidence. This demonstrates that the Morning Jarimatika Game promoted drive, self-assurance, and classroom engagement in addition to cognitive accomplishment.

Additionally, the learning exercise made the classroom more lively. In addition to listening to the instructor, the students directly practiced counting through game challenges and finger movements. Students were able to acquire numeracy through practical experience thanks to this circumstance. Additionally, the game structure lessened the stress that children frequently experience when learning mathematics and made the process more fun.

Table 8. Effect Size Result

Effect Size	Standardizer	Point Estimate	95% CI Lower	95% CI Upper	Category
Cohen's d	8,28	-2,75	-3,53	-1,97	Large
Hedges' correction	8,42	-2,71	-3,47	-1,93	Large

Glass's delta	8,66	-2,63	-3,55	-1,70	Large
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The study's findings demonstrate that the Morning Jarimatika Game improved the pupils' numeracy abilities at SD 77 Penerokan. The mean pretest score increased from 63.20 to 86.00 on the posttest, indicating this. Students' numeracy achievement improved after playing the Morning Jarimatika Game, as seen by the mean difference of 22,80 points. The difference was statistically significant, according to the results of the Independent Samples t-test ($t(48) = -9,73$, Sig. $< 0,01$) and the one-way ANOVA ($F(1,48) = 94,69$, Sig. $< 0,01$).

The features of Jarimatika as a finger-based counting technique account for the increase in kids' numeracy abilities. Students can represent numbers and mathematical operations by using their fingers as concrete medium. Since primary school pupils still require visual and tactile assistance when learning mathematical concepts, concrete representation is crucial. (Frey et al., 2024) demonstrated that teaching pupils finger-based numerical strategies can enhance their arithmetic skills, particularly in addition and subtraction. As a result, Jarimatika's application in this study has a solid theoretical and empirical foundation. The game component enhanced pupils' numeracy abilities in addition to providing tangible representation. Playing games makes counting less tedious and more engaging. Students are motivated to practice more actively when they engage in challenges, constructive competition, and group projects.

Russo et al. (2024) found that non-digital math games in elementary classrooms typically improve students' attitudes toward and performance in the subject. This is consistent with the study's observation results, which demonstrated that when numeracy instruction was presented as a game, students were more passionate, engaged, and self-assured

Another benefit of the Morning Jarimatika Game is that it was introduced as a brief ritual at the start of the school day. Students had the chance to practice regularly thanks to this regimen. Counting fluency can be strengthened with brief but frequent exercise. Before starting the main class, morning activities serve as cognitive warm-ups to assist pupils concentrate. As a result, the Morning Jarimatika Game serves as a method to prepare students for studying mathematics in addition to being a counting technique.

The results of this study indicate an improvement in students' numeracy skills following the implementation of the Morning Jarimatika Game. Descriptive analysis shows an increase in students' average numeracy scores from the pretest to the posttest. Further statistical analysis supports this finding. The normality and homogeneity tests confirm that the data meet the assumptions required for parametric testing. The results of the paired sample t-test reveal a statistically significant difference between pretest and posttest scores. In addition, the N-gain analysis indicates a moderate level of improvement, while the effect size calculation shows a strong magnitude of change. Overall, these findings demonstrate that the implementation of the Morning Jarimatika Game is associated with measurable improvements in students' numeracy performance (Jumadiyah & Zumrotun, 2024).

Additionally, (Yohanah et al., 2024) The results show that the implementation of the Morning Jarimatika Game was associated with improvements in fifth-grade students' numeracy skills. The N-gain analysis yielded a mean score of 0.62, indicating a moderate level of improvement. In addition, the effect size analysis using Cohen's d produced a value of 2.75, indicating a large



magnitude of change. These findings indicate that there is a measurable difference in students' numeracy performance before and after the implementation of the intervention.

However, it's important to understand how the Morning Jarimatika Game improves numeracy proportionately. While Jarimatika is a great tool for teaching basic math operations and counting fluency, more comprehensive numeracy development still calls for contextual questions, strategy discussion, reasoning, and problem-solving exercises. According to (OECD, 2023), mathematical literacy is the capacity to apply and understand mathematics in practical settings. Thus, as stressed by (Yohanah et al., 2024), the inclusion of word problems is crucial so that the Game Morning Jarimatika enhances students' capacity to comprehend information, select the appropriate operation, and make mathematical decisions in addition to counting skills. In order to help children become proficient in counting and comprehend the relevance of mathematics in everyday life, teachers should integrate Jarimatika with problem-solving exercises.

The results should still be cautiously interpreted. One group with pretest and posttest data was used in this investigation. Because the scores were divided into two data categories, the available difference test output took the form of an Independent Samples t-test. To better match the one-group pretest-posttest design, additional analysis should employ the Paired Samples t-test if paired raw data for every student is available. Regular learning, more practice, teacher guidance, and students' expertise answering exam questions may all have an impact on the score improvement.

The Morning Jarimatika Game can be regarded as a successful numeracy learning method for elementary school pupils based on the findings and debate. This exercise blends morning routines, game-based learning, and finger-based counting. Students can practice numeracy in a tangible, engaging, and fun way with the aid of these three components. Because it doesn't require expensive learning materials or digital equipment, the approach is very simple to implement. To encourage numeracy practice in the classroom, teachers can use students' fingers, oral questions, group challenges, and brief reflections.

Overall, SD 77 Penerokan kids' numeracy abilities were enhanced by the Morning Jarimatika Game. This conclusion is supported by the modest N-gain score, the substantial impact size, the observation findings, the significant hypothesis test result, and the increase in the mean score. Teachers should still incorporate contextual and reasoning-based exercises with Jarimatika, though. This is crucial so that kids can gain a deeper understanding of numeracy for everyday life in addition to increasing their counting speed.

DISCUSSION

The findings of this study indicate that the Morning Jarimatika Game contributes to improving students' numeracy skills. This improvement can be explained through the characteristics of the Jarimatika method, which utilizes fingers as a concrete learning medium. For elementary school students, concrete representations play an important role in helping them understand abstract mathematical concepts, particularly in basic arithmetic operations. From a pedagogical perspective, the integration of finger-based strategies supports active learning by engaging students directly in the learning process. The use of physical movement allows students to connect symbolic numbers with concrete actions, which facilitates understanding and retention.

In addition, the incorporation of game-based elements creates a more engaging and interactive learning environment, encouraging students to participate more actively and confidently.

The routine implementation of the Morning Jarimatika Game also highlights the importance of consistent practice in developing procedural fluency. Repeated exposure to counting activities helps strengthen students' memory and improves their ability to perform arithmetic operations more efficiently over time. These findings are consistent with previous studies indicating that Jarimatika can enhance numeracy literacy, arithmetic fluency, and conceptual understanding. However, this study extends prior research by showing that its effectiveness is strengthened when implemented as a structured daily routine combined with game-based learning.

Beyond improvements in test performance, this study contributes to the fields of Learning and Teaching and Educational Effectiveness by demonstrating how a simple, low-cost instructional strategy can be effectively integrated into classroom practice. It highlights the importance of student-centered, interactive, and routine-based approaches in supporting numeracy development. Despite these contributions, several limitations should be acknowledged. The use of a one-group pretest-posttest design without a control group limits the ability to attribute improvements solely to the intervention. Additionally, the study focuses primarily on basic arithmetic skills and does not extensively measure broader aspects of numeracy such as reasoning and problem-solving.

Future research is recommended to employ more rigorous experimental designs, including control groups and larger sample sizes, as well as longer intervention periods. Further studies could also explore broader dimensions of numeracy, including mathematical reasoning and real-life problem-solving skills.

CONCLUSIONS

This study answers the research question by demonstrating that the Morning Jarimatika Game effectively improves elementary students' numeracy skills. The findings confirm that integrating a finger-based and game-oriented activity into classroom practice can support students in understanding and performing basic arithmetic more effectively. In terms of practical implications, the Morning Jarimatika Game can be utilized as a simple, low-cost, and engaging instructional strategy in elementary classrooms. Teachers are encouraged to incorporate this activity as a regular numeracy warm-up to strengthen students' foundational skills while promoting active participation and enjoyment in learning mathematics. For future research, it is recommended to employ more rigorous experimental designs, such as including control groups and larger sample sizes, to enhance the generalizability of the findings. Further studies could also explore long-term implementation and examine broader dimensions of numeracy, including mathematical reasoning and problem-solving in real-life contexts.

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