

The Jarimatics Method in Improving Students' Numeracy Skills

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ABSTRACT: *This study explores students' understanding before and after applying the jarimatics method in learning mathematics, considering Islamic educational models or perspectives. This objective involves understanding how the jarimatics method can enrich an Islamic education-based learning approach and identifying its impact on improving students' numeracy skills in basic number operations. The research method uses quantitative research. The number of subjects is 20 grade 1 students of PPWNI Klang divided into two experimental groups of 10 and a control group of 10. This study's results indicate that the experimental group's posttest average value is 90.70 higher than the value of the control group, which is 81.50. Based on the t-test, a significance of $0.000 < 0.05$ indicates a significant effect on applying the Jarimatics Method to the numeracy skills of grade 1 students. PPWNI Klang, Selangor Malaysia. The jarimatics method provides an approach that is easy to understand, does not burden students' thinking power, and provides certainty in mathematical calculations. The results of this study also support the opinions of experts and previous data modelling, which show the benefits of the jarimatics method in the context of learning mathematics. By paying attention to aspects of Islamic education in the Jarimatics method, this approach becomes relevant and valuable to develop quality students' understanding of mathematics by paying attention to spiritual and moral aspects of the learning process.*

Penelitian ini bertujuan untuk mengeksplorasi pemahaman siswa sebelum dan sesudah penerapan metode jarimatika dalam pembelajaran matematika, dengan mempertimbangkan model-model atau perspektif pendidikan Islam. Tujuan ini melibatkan pemahaman tentang bagaimana penggunaan metode jarimatika dapat memperkaya pendekatan pembelajaran berbasis pendidikan Islam, serta mengidentifikasi dampaknya terhadap peningkatan kemampuan berhitung siswa pada operasi bilangan dasar. Metode penelitian menggunakan penelitian kuantitatif, jumlah subjek 20 siswa kelas 1 PPWNI Klang dibagi menjadi dua kelompok eksperimen sebanyak 10 siswa dan kelompok kontrol sejumlah 10 siswa. Hasil penelitian ini menunjukkan bahwa nilai rata-rata posttest kelompok eksperimen yaitu 90.70 lebih tinggi dibandingkan dengan nilai kelompok kontrol yaitu 81.50 Berdasarkan uji t diperoleh signifikansi $0,000 < 0,05$ yang menunjukkan adanya pengaruh yang signifikan pada penerapan Metode Jarimatika terhadap kemampuan berhitung pada siswa kelas 1 PPWNI Klang, Selangor Malaysia. Metode jarimatika menyediakan pendekatan yang mudah dipahami, tidak membebani daya pikir siswa, dan memberikan kepastian dalam perhitungan

matematika. Hasil penelitian ini juga mendukung pendapat para ahli dan pemodelan data sebelumnya yang menunjukkan manfaat metode jarimatika dalam konteks pembelajaran matematika. Dengan memperhatikan aspek-aspek pendidikan Islam dalam metode Jarimatics, pendekatan ini menjadi relevan dan bermanfaat menjadi salah satu upaya untuk mengembangkan pemahaman matematika siswa yang berkualitas dengan memperhatikan aspek spiritual dan moral dalam proses pembelajaran.

Keywords: *Jarimatika Method, Calculating Ability, Teaching Method.*

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I. INTRODUCTION

Education aims to cultivate enthusiastic, active, creative, and knowledgeable students. Learning calculation operations, especially in mathematics, is crucial for developing students' rational thinking skills (Dong & Kang, 2022). The PPWNI Klang learning studio follows the KTSP curriculum, which emphasizes understanding calculation patterns, reasoning, problem-solving with mathematical models, and interactive problem-solving (Baedhowi, 2016). Students must be optimistic, capable, and confident in mathematics (Atiaturrahmaniah, 2011). However, grade 1 students at PPWNI Klang need help writing and memorizing numbers, mainly due to a lack of parental support. Educators strive to foster interest in mathematics among these active students in the early stages of cognitive development and require guidance from family and teachers.

Many students, especially those with limited abilities, need help with mathematical calculation operations. A lack of interest in mathematics also contributes to this difficulty (Lin, 2023). Grade 1 students face challenges in reading, writing, memorizing, and arithmetic, so they need support and effective methods to improve the quality of learning. The National Government emphasizes the importance of developing patterns of thinking and knowledge in primary schools by promoting productive activities that encourage effective problem-solving and communication of ideas (Chi et al., 2023).

The need for more teaching staff at PPWNI Klang hurts student learning due to the insufficient number of teachers to pay attention to students' individual abilities. Grade 1 students especially need help understanding and remembering math concepts. Although rote learning is still used in learning to count, it is essential to consider alternative approaches to delivering the material. As a fundamental aspect of mathematics, counting can challenge and burden students (Li et al., 2023).

The role of the teacher at the Indonesian Citizenship Education School (PPWNI) Klang is as a professional facilitator and guide for students, as well as introducing Indonesian culture. In learning mathematics, educators need to consider student motivation. In developing students' mindsets, support that can motivate students and the level of student learning desires is essential (Uno, 2012). At PPWNI, grade 1 students need guidance in learning because parents need more attention to their development. Even though students still have limitations in understanding and accepting material, their enthusiasm for learning and learning new things remains

high. The education system in Indonesian schools in Kuala Lumpur PPWNI Klang uses Malay as the common language (Haryanto, 2015).

Learning is a learning effort for students. The effectiveness of learning methods is a measure of the success of the student learning process (Himmah et al., 2021). There are two efficiencies in the learning stages: the efficiency of the selection stage and the effectiveness of the results stage. If the process is effective, then the learning activities that have been designed can be carried out correctly and by the material. Learning is a step to understand something to get new things that will affect overall changes due to experience and environment (Elneel et al., 2023). Student learning responses are the result of the stimulation given by the teacher (Bailey et al., 2023).

PPWNI is an institution in Klang, Selangor, Malaysia. Class 1 students at PPWNI Klang have difficulty counting, especially with the rote method. An alternative method that can be applied is the jarimatics method, using the fingers as a means of addition and subtraction (Afriani et al., 2019). This method can help students understand basic calculations well. The way presented in concrete form is easy for students to understand. Teachers need to develop mathematical calculation methods that are appropriate to the material and can make learning more enjoyable. Jarimatika can be an effective method of choice. This method has advantages in visualization and triggering students' interest and excitement. Its use is manageable for students' mindsets. However, PPWNI Klang faces limited learning facilities and infrastructure constraints, including books and learning tools.

The finger method is a method of counting using the fingers as a means of addition and subtraction. This method helps students understand the concept of addition and subtraction in a simple and fun way (Thoyyibah, 2020). The advantage of jarimatics is that it increases students' enthusiasm for arithmetic and does not burden students' mindsets. This method can be applied to students aged 6-12 years, especially in elementary schools, using teaching aids, practices and games (Crescentini et al., 2012);(Hidayah & Sugiarto, 2015). In learning mathematics, it is essential to introduce problems appropriate to the situation and provide guidance in understanding mathematical theory (Pitajeng). Teachers must work professionally to guide grade 1 students in learning to count. Mathematics learning needs easy-to-understand and fun methods and pays attention to student development in four stages (natural, semi-real, semi-abstract, and abstract). The jarimatics method can be a solution to improve students' ability to count quickly and be fun, especially considering the lack of standard learning media and the power of students who still need to improve (Novita et al., 2023).

Islamic education plays a crucial role in shaping the holistic development of students, including their numeracy skills. Integrating Islamic values and teachings in learning is essential for a comprehensive educational experience. In line with this, the Jarimatics method offers a valuable approach to enhancing students' numeracy skills while incorporating Islamic principles. This method emphasizes using fingers as a tool for counting and calculation, allowing students to visualize mathematical operations practically and engagingly (Ikhwan, 2021b).

By applying the Jarimatics method in Islamic education, students can develop a solid foundation in numeracy skills while nurturing their understanding of Islamic values. This approach enables educators to instil concepts such as moderation, precision, and accuracy, inherent in Islamic teachings, into the learning process. Moreover, the

Jarimatics method aligns with using concrete objects to facilitate learning, as Islamic education emphasises. This approach helps students grasp mathematical concepts more effectively, as they can relate them to real-life situations and apply their knowledge practically (Ikhwan et al., 2020).

Implementing the Jarimatics method in the context of Islamic education creates a conducive learning environment that fosters enthusiasm, active participation, and creativity among students. Through this approach, educators can cultivate students' critical thinking skills and rational reasoning abilities, which are fundamental aspects of Islamic education. By integrating Islamic values and teachings into the Jarimatics method, educators can develop well-rounded individuals proficient in numeracy and uphold moral and ethical values in their academic journey (Amrin et al., 2022).

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II. METHOD

This research method uses a quantitative approach with experimental and control groups. This test aims to evaluate the effectiveness of the Jarimatika method in improving students' numeracy skills. Observations were made to measure the level of implementation of the Jarimatika method. This research was conducted at PPWNI Klang, Selangor, Malaysia, in December 2022, involving ten students from class 1A and ten from class 1B at PPWNI Klang. The Jarimatics method was applied in five meetings; where at the first meeting, students were given an understanding of addition and subtraction; at the second meeting, they carried out exercises to observe students' arithmetic abilities; at the third meeting, students were introduced to the Jarimatics method in the context of addition and subtraction, at the fourth meeting an understanding was carried out. Repeat and practice counting using fingers, and at the fifth meeting, students are given a pretest and posttest to measure their numeracy skills. Data is collected through tests. Data analysis was carried out in December 2022. The stages of the research included theory, hypotheses, research design, selection of research subjects/respondents, and data collection (Nazir, 2014);(Ikhwan, 2021a). Many students experience difficulties solving math problems, as seen in the pretest, which shows that grade 1 students are still slow and have difficulty calculating and understanding how to solve problems correctly and quickly. Therefore, this study used class 1A as the experimental group and class 1B as the control group. In testing the hypothesis, the t-test (t-test) is used with two hypotheses, namely the alternative hypothesis (H_a) and the null hypothesis (H_0). The idea in this study is as follows:

H_a : There is a positive and significant effect of applying the Jarimatika method on the learning outcomes of addition and subtraction of grade 1 students at PPWNI Klang, Selangor, Malaysia.

H_0 : There is no positive and significant effect of applying the Jarimatika method on the learning outcomes of grade 1 students at PPWNI Klang, Selangor, Malaysia.

The results of the t-test are then compared with t tables at a significance level of 5% with the following criteria: if $t_{\text{count}} > t_{\text{table}}$, then H_0 is rejected, and H_a is accepted, whereas if $t_{\text{count}} < t_{\text{table}}$, then H_0 is accepted and H_a is rejected.

III. RESULT AND DISCUSSION

The Results of the Research from the Posttest and Pretest Value Data

The results of this study consisted of post-test and pretest value data in the experimental and control groups. At this stage, it aims to compare before and after applying the jarimatics method. Seeing the initial condition of students still having difficulty in counting, addition and subtraction, and accuracy in counting. The authors used pretest and posttest tests in experimental and control classes to determine students' numeracy skills. Class 1A had as many as ten students as an experimental group, and Class 1B had as many as ten as a control group. To find out the comparison of the ability to calculate classes 1A and 1B.

In the first stage, the experimental and control groups were given a pretest test of 10 questions and worked for 15 minutes. The author observed how to count students in doing the test from this test. In the second stage, students were given a posttest test after applying the jarimatics method, where the experimental and control classes were offered ten questions with a time of 15 minutes. In the post-test stage, observations were also made on how to count students in working. The test results can be known after the posttest and pretest tests are carried out in the experimental and control groups.

In the pretest and post-test tests, it can be known the numeracy ability of grade 1 PPWNI KLANG students where at the pretest test stage the experimental group with a total of 10 students got an average score of 0.151 while in the control group with a total of 10 students, obtained an average score of 0.316. It can be known that the calculation ability of students in the experimental and control classes still needs to improve. The results of the second stage are posttest tests where this test is carried out after applying the jarimatics calculation method. In class 1A, the experimental group obtained an average score of 0.172; in class 1B, the control group received an average score of 0.038. From the results of the pretest and posttest tests, it is known that there are significant differences between experimental and control classes. It can be concluded from the average score of this posttest that applying the jarimatics method successfully improved the numeracy ability of Grade 1 PPWNI Klang students.

Prerequisite Test

Normality Test

The purpose of this normality test is to find out whether the data obtained is normally distributed or not. The results of the posttest and pretest data normality test in the experimental group and control group are as follows:

Table 1. Test Results of normality test of posttest and pretest data of experimental group and control group

Data	Probability(p)/ sigcount	Sig	Information
Posttest experiment	0,686	0,05	Normal

Posttest kontrol	0,614	0,05	Normal
Pretest experiments	0,018	0,05	Normal
Control pretests	0,439	0,05	Normal

Based on the data in the table above shows average distributed data. So it can be known that Sigcount > Sigmin which means the results of normal data distribution.

Homogeneity Test

The study's homogeneity test aims to determine whether the two groups of rice are from the same population or not. Where can be known the results of the homogeneity test are listed in the following table.

Table 2. Test results of homogeneity of experimental group and control group

Data	Probability(p)/sigcount	Sig	Information
Posttest	0.021	0,05	Homogeneous
Pretest	0.021	0,05	Homogeneous

Test t

The results of the t-test posttest of numeracy ability are used to determine the effect of the jarimatics method on student learning outcomes. This t-test is performed with SPSS Statistics as follows:

Table 3. T-test Posttest results of students' numeracy ability

Aspects	Experiment	Control
Mean	90.70	81.50
N	10	10
Sig.(2-tailed)	0.000	
Information	Significant	

It can be seen from the table that the average score of the experimental group with the number of 10 students is 90.70, while the control group gets an average score with the number of 10 students, which is 81.50. Based on the calculation results with the T-test, get a significance value of 0.000. It is known that the significance value (2-tailed) <0.05 indicates a significant difference between the initial variable and the final variable. In the T-test significance test 0.000 <0.05, H₀ is rejected, and H_a is accepted, which means there is a significant change in the effect of the difference in application given to each variable. With this, there are positive and meaningful differences regarding the results of students' numeracy skills in the experimental group and the control group.

Implementation of the Jarimatics Method in Enhancing Numeracy Skills

Jarimatika is a method of calculating addition and subtraction operations using the students' fingers. This concept was introduced by (Wulandari, 2009). The jarimatika method utilizes jarimatika as a calculating tool, which allows students to perform mathematical calculations using their fingers. This approach has several advantages that make it attractive in learning mathematics. One of the main advantages of the jarimatics method is the ease of learning and understanding by students. Using their fingers, students can easily visualize and remember math concepts, such as addition and subtraction. This method assists students in developing a solid understanding of basic mathematical operations (Sunyoto & Harjoko, 2014).

In addition, the jarimatics method is also effective in preventing boredom in counting. In the traditional way, students often feel bored and bored when doing repetitive mathematical calculations. However, with jarimatics, students can experience more exciting variations and activities in learning mathematics. Using fingers as a counting tool provides a fun and interactive experience for students, making them more enthusiastic about participating in learning (Purwanti & Khoiriyah, 2020).

The importance of understanding the use of fingers in the jarimatics method was also highlighted by (Syahputra et al., 2019). The principle that needs to be understood is that the fingers of the right hand are used as units of numbers, while the fingers of the left hand are used as tens. This helps students understand the role of each finger and form a more structured mindset in counting.

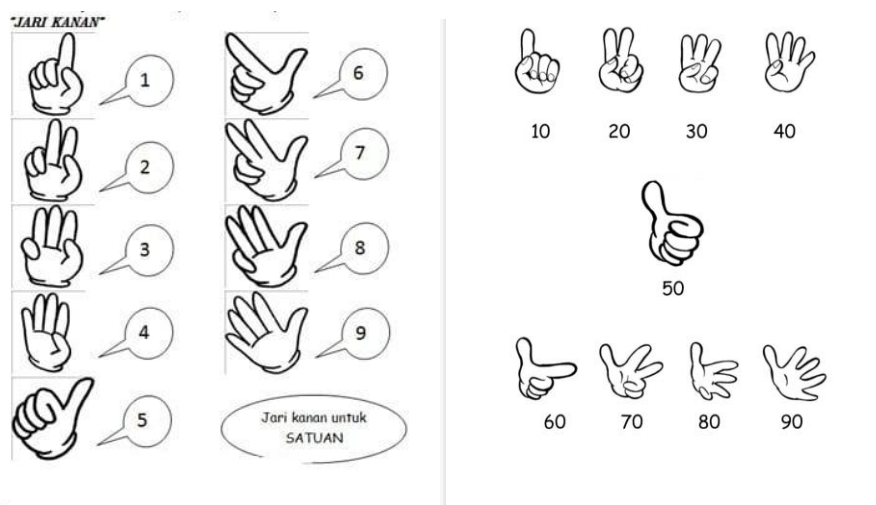


Figure 1. Jarimatics formation

In (Rafflesia et al., 2018) developed the concept of forming summative fingers. Each open finger on the hand has a specific addition operation in this concept. When a finger is exposed, the added value is one. If more than one finger is open, the value is added according to the number of open fingers. This approach provides clear guidance for students in performing addition operations using their fingers.

The teacher's role in learning mathematics is significant in shaping students' understanding of jarimatika. Teachers must create an exciting learning atmosphere and motivate students to learn to count quickly and have fun according to their abilities. With the right approach, the teacher can activate students' interest and enthusiasm in learning mathematics (Suparni, 2018).

Learning by using summative fingering allows students to visually see and feel the concept of addition through their fingers. In summatic fingering, students will learn to associate finger movements with the value that must be added. Through practice and repetition, students will become familiar with this concept and be able to perform addition operations more quickly and effectively.

In addition, the summative finger method also teaches students about patterns and relationships between the fingers. They learn that when a finger is exposed, the value added is one, and when more than one finger is exposed, the value added corresponds to the number of fingers exposed. This helps students understand mathematical patterns more thoroughly and develop logical thinking in arithmetic.

This research was conducted with experimental methods, which were divided into two groups, namely the experimental and control groups. This was done in the early stages of both groups. The pretest result for the experimental group was 0.018, and the control group was 0.439. Both groups were deficient, with no notable differences in the early stages of the experimental and control groups. Furthermore, the application was given to the experimental group. This experimental group was assigned treatment using the jarimatics method, while in the control group, only learning was carried out as usual or conventional.

After the study, the experimental and control groups were given a posttest. Posttest aims to determine students' final numeracy skills after being applied. The posttest results showed that the experimental group obtained an average value of 0.686, while the control group obtained 0.614. Based on these results, it is known that the value of the experimental group is greater than the control group. In the results of the T-test test, it is known that the experimental group's value got 90.70, and the control group got an average value of 81.50, thus showing an increase in the average value in the experimental group more incredible than the control group. Significant (2-tailed) obtained $0.000 < 0.05$ with meaningful analysis that showed significant changes in the effect of different applications given to each variable. With this, the application of the jarimatics method has a positive and significant influence on students' numeracy skills compared to conventional learning of grade 1 PPWNI Klang students.

According to the data from the results of the research conducted, it is known that the jarimatics method has a positive influence on the learning outcomes of calculating the addition and subtraction of students. As (Wulandari, 2009) argues, this jarimatics method is easy, does not burden students' thinking power in calculating, and can provide a definite value for a certain number. The jarimatics method offers convenience and affects the speed and accuracy of counting. So that in addition to learning, student subtraction can be memorable and foster student interest in education. In line, where inappropriate and appropriate techniques are aimed at achieving better learning outcomes. Applying this jarimatics method can improve the ability to count and obtain good results.

In the context of Islamic education, applying the jarimatics method in improving students' numeracy skills can be seen as a step that is by the principles of Islamic teaching. Islam encourages its followers to seek knowledge and improve their thinking abilities and skills. Therefore, the jarimatics method that empowers students to count using their fingers as a tool is a form of a creative and practical approach to teaching mathematics.

In Islamic teachings, the search for knowledge is included in religious orders. Education in Islam is not only about studying spiritual teachings but also includes general valuable understanding for everyday life. In this case, the jarimatics method provides a helpful mathematical knowledge for students to deal with various life situations.

In addition, Islamic education also emphasizes the importance of justice and equality in the learning process. Using the jarimatics method gives every student the same opportunity to develop their numeracy skills. This method does not burden students cognitively so that all students can feel comfortable and motivated to learn.

In Islam, any action that benefits individuals and society is considered a good deed. The jarimatics method provides tangible benefits in improving students' numeracy

skills in education. By improving math skills, students can be better prepared to face future challenges and positively contribute to society.

In Islamic-based learning, educators are also expected to look for models by religious values. The jarimatics method, with its interactive approach and combining fingers as a tool, is an appropriate learning model in Islamic education. In this case, the jarimatics method exemplifies how Islamic education can combine religious principles with practical and fun learning.

Overall, applying the jarimatics method in improving students' numeracy skills is a step that aligns with the principles of Islamic education. This method empowers students to seek knowledge, provides benefits for them, and is by religious values that encourage justice, equality, and gifts for society. By considering the model in Islamic education, the jarimatics method can be part of an effort to harmonize learning with religious teachings and produce a generation that is intelligent and has a noble character by Islamic guidelines.

IV. CONCLUSION

In a study, the experimental method was used to study the effect of the jarimatics method on students' numeracy skills. This study consisted of two groups, namely the experimental group and the control group. In the early stages of the study, a pretest was conducted to measure the initial abilities of the two groups. The pretest results showed that both the experimental and the control groups were in the deficiency category without any significant differences. Furthermore, the jarimatics method was applied to the experimental group while the control group continued learning as usual. After the learning period, a posttest was carried out to measure students' final numeracy abilities. The post-test results showed that the experimental group had a higher average value than the control group.

Further analysis using the T-test showed that the increase in the average value of the experimental group was more significant than the control group. With statistically significant results, applying the Jarimatika method positively and significantly affects students' numeracy skills. The jarimatics method is effective because it facilitates understanding, increases the speed and accuracy of calculations, and triggers students' interest in learning. In addition, the application of the jarimatic method is also by the principles of Islamic education. Islam encourages searching for knowledge, increasing thinking skills, and applying religious values in learning. The jarimatics method that uses fingers as a counting tool is a creative and practical approach to learning mathematics.

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