At-Thullab : Journal of Madrasah Ibtidaiyah Teacher Education
Volume 8 Number 1 Year 2024
P-ISSN: 2579-625 e-ISSN: 2621-895X

Basic Jarimatika is a Multiplication Solution in Learning in the Merdeka Curriculum for Preservice Elementary Teacher

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Abstract: Multiplication in Mathematics lessons is a problem for elementary school students. Basic math is the solution to this multiplication problem. Basic Jarimatika is a method that uses the fingers of the hand to solve students' problems in calculating based on the rules of hand formation and the solution of Jarimamatics. This research aims to 1) find out preservice elementary teachers' responses after learning Jarimatika, and 2) provide an overview of the need for using Jarimatika media in the preservice elementary teacher curriculum. The research method used is *mixed*. The type of *mix-method method* used is *concurrent embedded* (a mixture of reinforcement where quantitative methods strengthen qualitative methods. The instruments used are structured interview instruments and open questionnaires. The results of this study provide an illustration that basic mathematics is given a good category in the analysis of the questionnaire obtained. This good category is strengthened by the interview media which gives the researcher the impression that students feel it is quite helpful in using Jarimatika to deepen the learning of multiplication basic multiplication at the elementary/MI level.
Keywords: Jarimatika, Multiplication Solutions, Preservice Elementary Teacher, Merdeka Curriculum.

 DOI: http://10.30736/atl.v8i1.1942

Received 09 March 2024, Accepted 01 June 2024, Published 02 June 2024

A. Introduction

Preservice elementary teachers (PET) IAIN Takengon are students who do not have the opportunity to study at campuses outside Central Aceh. 80% of students at IAIN Takengon are students whose original residence is in Central Aceh. The abilities of IAIN Takengon students are classified as medium to low. PET in particular have mathematical skills that still need to be honed. The aim of improving the mathematical abilities of PET is to create qualified teacher candidates who can innovate on a large scale.

Students' mathematical abilities can be seen from the *pre-test scores* that have been carried out. The mathematics score in multiplication obtained by semester 4 students here only has an average of 60. This means that students have not yet completed the

basic multiplication course. Learning difficulties in the field of Mathematics can be overcome with basic mathematics methods.

Learning difficulties are a form of inability or lack of success in mastering concepts, principles or algorithms, even though you have tried to learn them. Indicators of learning difficulties are 1) inability to remember one or more conditions used; 2) inability to remember the conditions sufficient to provide a term for a particular object; 3) inability to conclude information from a given concept (Zarkasyi 2018) . The learning difficulties experienced by many students in studying Mathematics have become a demand for teachers to provide interesting learning alternatives. Mathematics as a basic science has developed rapidly both in terms of material and its uses so when studying it in Madrasas, you must pay attention to developments in the past, present and future. Students think that learning mathematics is difficult, so students are less interested in learning mathematics.

Mathematics is a subject that must be mastered by class teachers, especially students of the Madrasah Ibtidaiyah Teacher Education study program. One of the institutions that produces quality teachers is the campus environment. The term for a campus is a miniature country where *the agents of change* are attached to the students.

Learning mathematics is a psychological process in the form of active activities in a person's efforts to construct, understand or master mathematical material to achieve learning goals. Sutherland in Sriyanto's book states that *"learning mathematics is about learning to use new tools which enable us to solve problems that would be difficult or impossible to solve with our old tools"* (Sriyanto 2017) . Learning mathematics is learning about the use of new tools that make it possible to solve problems that are difficult or impossible with old tools. This shows that learning mathematics is learning to find solutions to problems related to mathematics.

Ebbut and Straker in Sriyanto's book state that school mathematics has several characteristics and each of these characteristics has implications for mathematics learning. The characteristics of school mathematics and its learning implications are: a) providing students with the ability to carry out discovery activities and investigate patterns to determine relationships; b) providing opportunities for students to carry out experiments in various ways; c) encouraging students to find sequences, differences, comparisons, groupings, and so on; d) encourage students to draw general conclusions; e) help students understand and find relationships between one understanding and another (Sriyanto 2017).

In the current era, humans act as *human-centred* and technology is the foundation. The aim of education in the current era is to focus on human development as creatures who have a lot of intelligence, knowledge and ethics which are supported by modern technological innovation (Daimah and Suparni 2023). The design of the independent learning education program will be able to develop the skills and competencies possessed by educators in learning. "According to Naufal, the constructivist learning model in Mathematics can improve students' cognitive abilities in the Era of Independent Learning." Therefore, qualified or competent human resources are needed to compete at

the world arena level. The quality of human resources needs to be further improved, especially at the tertiary level, so that alumni of a tertiary institution can compete (Anggreini and Priyojadmiko 2022). National education also functions to develop abilities and shape the character and civilization of the nation which aims to develop the potential of students to become human beings who have faith and devotion to God Almighty, have a noble character, are healthy, knowledgeable, capable, creative, independent, and become citizens who democratic and responsible (Ansori 2019).

Based on the statement above, gives us an idea as an academic community that the education expected by the government is education that has independent creativity in creating the next generation in the future. One of the media that can provide solutions to students' difficulties in learning mathematics is Jarimatika. According to Prasetyo in the *public* media manuscript journal, Jarimatika is a way of calculating mathematics using finger tools. With this Jarimatika media, students are trained to memorize the use of Jarimatika in basic multiplication. The involvement of students in demonstrating mathematics can make learning more meaningful. Apart from being flexible, this mathematical media also does not burden the child's brain memory in the counting process, showing a high level of accuracy. Using Jarimatika Media to improve learning outcomes for multiplication material in class IV students at SD Negeri Combongan III Sukoharjo. According to Kristiawati in the book Nur Fausia AM Irfan Link Asfar and Sugian Nurwijaya, states that they can use their fingers to solve their counting problems based on the rules of hand formation and finger solving (AM, Asfar, and Nurwijaya 2020) .

Counting is one of the basic skills that every student, especially PET, must have. The ability to count is one of the goals of learning mathematics. According to GBPP, the mathematics subject in elementary school, a special test for teaching mathematics, is to grow and develop numeracy skills as a tool in everyday life and develop knowledge. Students are invited to play using the ten fingers they have based on mathematics as a provision for further learning (Mariyati and Sari 2017) . Tasliah et al., 2019 explained that the world of children is the world of play, using the Jarimatika method to hone their ability to operate Jarmatics.

Jarimatika is a way of counting (multiply-divide-add-subtract operations) using the fingers of the hand. Jarimatika is a simple and fun way of teaching basic counting to children according to the rules: starting with a correct understanding of the concept of numbers, number symbols, and basic counting operations, then teaching counting with the fingers (Mariyati and Sari 2017) .

Based on the opinions of several figures above, it can be concluded that Jarimatika media is a learning aid for students who use their fingers. Learning to use Jarimatika media can create feelings of joy so that the learning that takes place can make it easier for students to understand the learning material.

PET at Elementary Program Study IAIN Takengon face problems in Mathematics courses, making it necessary to find the best solution. By inserting the teaching of mathematics into courses, it becomes something that is felt to be necessary and useful.

In this way, it is hoped that PET at IAIN Takengon will become a student who can help elementary school students understand basic multiplication material well. With the application of Jarimatika, it is hoped that students will apply Jarimatika learning when they have difficulty teaching mathematical multiplication to their students in the future. Therefore, the problem formulation in this journal is 1) Knowing student responses after studying mathematics; and 2) provide an overview of the need for using Jarimatika media in the student curriculum.

B. Method

Implementation of basic mathematics teaching using demonstration and practice methods together followed by discussion. The sample used in this research was the 5th-semester PET at IAIN Takengon. Data collection was carried out using a *mixed method* with the type namely *concurrent embedded* (a mixture of reinforcement where quantitative methods strengthen qualitative methods (Ilham Junaid, 2016: 72). Qualitative data collection was carried out using structured interview instruments (Sirajuddin Saleh, 2017, 48). and the quantitative data used used an open questionnaire instrument. The interview method was conducted on 7 students who had different levels of ability. This interview was conducted to strengthen findings in the field regarding the application of Elementary Program Study class 4th semester learning media. The questionnaire was given to all 4th-semester students. totaling 17 students. The selection of 4th-semester students was due to the Mathematics subjects taken by students in the 4th semester.

The analysis uses Miles and Huberman's analysis with three stages of qualitative analysis. The analytical method used is data analysis according to *Miles* and *Huberman*, where qualitative data is obtained from data *reduction*, data *display* and *conclusion drawing* or *verification* (Saleh 2017) . Quantitative data was analyzed using percentage analysis. This research is in the form of applying basic mathematics methods to make it easier for students to teach basic multiplication mathematics. The indicator of the success of this activity is that at least 80% of students in one class can use mathematics and understand this method. The scale used in the questionnaire distributed by students is a Likert scale with the lowest score being 1 and the highest being 4. Then the scores 1-4 are converted into the number 100 with the formula, namely:

$$Nilai = \frac{jumlah\ nilai}{skor\ maksimal} x\ 100\%$$

Criteria for the required scale:

90-100%= Very Good
80-89% = Good
70-79% = Fairly Good
60-69% = Low
50-59% = Very Low
40-49% = Very Low (Sugiyono 2022)

C. Results And Discussion

The use of mathematics can make it easier for children to calculate without calculating tools but only using their fingers. The benefit that children get apart from counting quickly is that children can understand the basic concepts in calculations which will continue to stick and be remembered by the child himself (Dian et al. 2021) .

The mathematics that will be taught to students is using 10 fingers to help solve basic multiplication problems. The fingers of the right hand indicate the number of multiplications of the first number and the left hand the number of multiplications the second number will perform. The following is an example of a learning image using the Jarimatika media in multiplication material which can help students facilitate the achievement of satisfactory learning outcomes. The following are steps for using mathematics which can be used as a guide to make it easier for students to learn. Look at the folds in Figure 1. Image a shows the number 9, image b for the number 8, image c for the number 7, and image d for the number 6. The folded fingers indicate the number of numbers to be multiplied. If one fold means 5 + 1 is 6. For the number 6. This also applies to the fingers that show the numbers 7, 8, and 9.

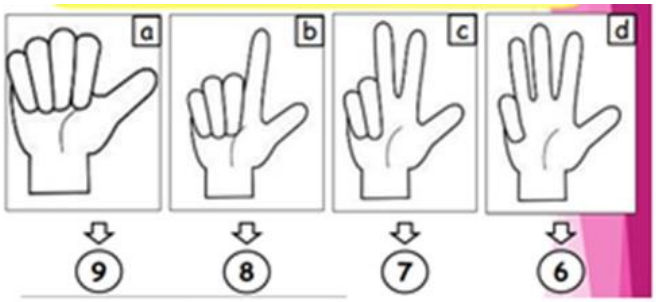

Figure 1. Steps to use Jarimatika

The description of the image is:

1. Fingers folded 4 = Value 9
2. Fingers folded 3 = Value 8
3. Fingers folded 2 = Value 7
4. Finger folded 1 = Value 6

The following is a presentation of practice questions which are exemplified by pictures of the use of Jarimatika.

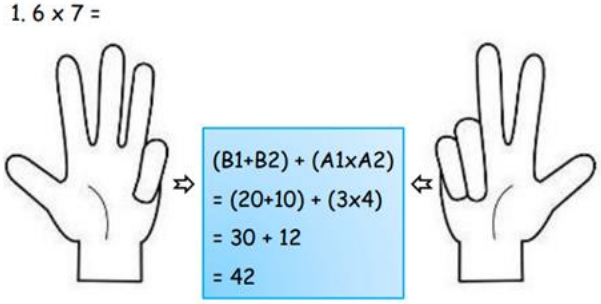

Figure 2. Example of working on multiplication problems (Nugroho 2019)

Figure 2 provides a description in the form of a picture of the left hand showing the folded little finger showing the number 6 when folded. Meanwhile, the right hand has two little fingers folded and the ring finger shows the number 7. The folded finger is worth tens. If there are three fingers folded that means there are thirty (30). Meanwhile, the number of fingers that stand upright is multiplied by the number of right and left fingers. The right side is 3 and the left is 4. When multiplied it produces 12. The number 30 added to 12 produces 42.

After implementing mathematics learning using Jarimatika, the students' responses after learning Jarimatika will be described and an overview of the importance of using Jarimatika media in the student curriculum.

Student Responses to Jarimatika Learning

Student responses to learning in this research were seen using the interview method which was conducted with 7 students who had different levels of ability. This interview was conducted to strengthen findings in the field regarding the application of PET semester 4 class mathematics media. The following is a transcript of the interview with the 7 students.

Student 1

BM is a student who has high abilities in his class, BM is a student who is classified as smart in his class so by being taught the various media provided, it is hoped that BM will become a smart teacher candidate and inspire many other students. By using Jarimatika media, BM is increasingly prepared to become an alumnus and become a great future teacher. The following are the results of the researcher's interview with the student.

Researcher : *Did you like learning to use Jarimatika media yesterday?*

B.M : *I'm glad sir, Jarimatika gives us greater insight into the steps we can give when we meet students who have difficulty memorizing basic multiplication.*

Researcher : *BM does not agree if Jarimatical media becomes a separate subject for PET.*

B.M : *I agree, sir, if we teach mathematics about multiplication material, it is easier, especially for students who have difficulty memorizing multiplication.*

Student 2

HA is a student who has high abilities in his class, HA can understand multiplication material using Jarimatika media, and HA can even apply it in everyday life by teaching his younger siblings and private students about using Jarimatika media. The following are the results of the researcher's interview with the student.

Researcher : *Son, how was your math study today?*

HA : *Very inspiring sir. Apart from being easy to understand, HA also understands other techniques better in understanding multiplication using mathematics.*

Researcher : *Then, HA, did you apply yesterday's learning at home or with other*

friends?

HA : *There is, sir. HA, if there is an assignment about multiplication, directly uses Jarimatika media because sometimes HA forgets large multiplications such as 9 x 7, apart from that, HA's sister also teaches HA. HHA also teaches privately to elementary/MI children in HA's environment so HA has conveyed some of the information that HA got from yesterday's lecture*.

Student 3

NS is a student who has high abilities in his class, NS is a student who is diligent in studying so that he can easily understand the material presented using Jarimatika media. The following are the results of the researcher's interview with the student:

Researcher : *Son, do you like learning mathematics about multiplication using the medium of mathematics?*

NS : *I like studying mathematics, sir. When I studied mathematics, my knowledge became broader and when I had difficulty doing multiplication and forgot, I immediately used the hand I had learned.*

Researcher : *So, if you like studying using Jarimatika media, do you want to study at home using Jarimatika media?*

NS : *I would like to, sir, because apart from being easy to work on Jarimatika media, it is also more fun, sir.*

Student 4

F is a student who has average abilities in his class, but after learning to use mathematics media he was helped to understand learning, especially learning mathematics. F is also a student who has difficulty memorizing multiplication and numbers. The following are the results of the interview with the student:

Researcher : *Do you like studying mathematics?*

F : *Like it sir. but sometimes I often feel confused, sir, studying mathematics, I find it difficult to understand mathematics, sir.*

Researcher : *When studying mathematics using the media Jarimatika? Does it make it easier for F to understand mathematics?*

F : *I like learning using Jarimatika media. Jarimatika makes it easier for me when I forget multiplication which I often forget. I have quite a poor memory, sir. I find it difficult to memorize numbers, including telephone numbers, and I also find it difficult to memorize them*

Student 5

AA is a student who has moderate abilities in his class, but after learning to use Jarmatics media he was greatly helped. The following are the results of the interview with the student.

Researcher : *Do you enjoy studying mathematics?*

A A : *I like it, but I don't understand mathematics lessons. From elementary school to high school, I had difficulty learning mathematics, sir.*

Researcher : *When you learned yesterday using mathematics media, were there any*

changes in understanding mathematical multiplication?

A A : *If I use Jarimatika media, I feel that it helps me memorise multiplication, sir.*

Student 6

KN is a student who has low ability in his class. After studying using the Jarimatika medium he also felt a little helped but still had difficulty memorizing the Jarimatika multiplication formulas. The following are the results of the interview with the student.

Researcher : *Do you enjoy studying mathematics?*

KN : *No sir, I don't like studying mathematics. I think mathematics is difficult for me to learn*

Researcher : *What do you think about using the Jarimatika media from yesterday's lesson, son? Is it still difficult for you to understand?*

KN : *I'm pretty good at understanding multiplication, but I have difficulty memorizing the tricks for calculating it.*

Student 7

R is a student who has low ability in his class, but after learning mathematics using Jarimatika media he was only helped by one Jarimatika technique. The following are the results of the interview with the student:

Researcher : *Do you like studying mathematics?*

R : *No sir, I can't learn mathematics from the beginning, I just don't memorize multiplication, sir.*

Researcher : *So, when we were studying mathematics yesterday, how did we use the mathematics medium? Do you also find it difficult?*

R : *Yesterday I understood a little, sir, so I was able to learn multiplication, sir... It's just that I still have a little difficulty memorizing it. There's only one way that I still remember to use Jarimatika.*

Based on the results of the interviews above, it can be concluded that students' responses to learning mathematics using Jarimatika media, of the 7 students interviewed, 5 students were helped by Jarimatika media, while 2 students who had low abilities had difficulty memorizing Jarimatika techniques.

The results of the interview above can be strengthened by questionnaire data that has been distributed to students. The questionnaire contains students' feelings when learning to use Jarimatika media. In Figure 3, a chart is presented regarding the results of student responses to mathematics learning using Jarimatika media.

Based on the data in Figure 3, it can be concluded that students' responses to learning mathematics using the Jarimatika media were good with good grades. This good score is obtained from the average score produced by all students who responded, namely 84% of the maximum score that can be given, namely 100.

Therefore, it can be concluded that Jarimatika can be used well by PET as curriculum material that must be mastered by PET at IAIN Takengon. Mathematics as a basic science has developed rapidly both in terms of material and its uses so that when

studying it in schools, you must pay attention to developments in the past, present and future. The characteristics of mathematics lessons are that the object of discussion is abstract, and the discussion relies on a system of reasoning, understanding/concepts or questions/characteristics that are very clearly tiered. So that it is maintained consistently involving calculations or workmanship (operations) and can be used in various aspects of science and daily life. Thus, learning mathematics requires understanding mathematical concepts correctly (Sriyanto 2017).

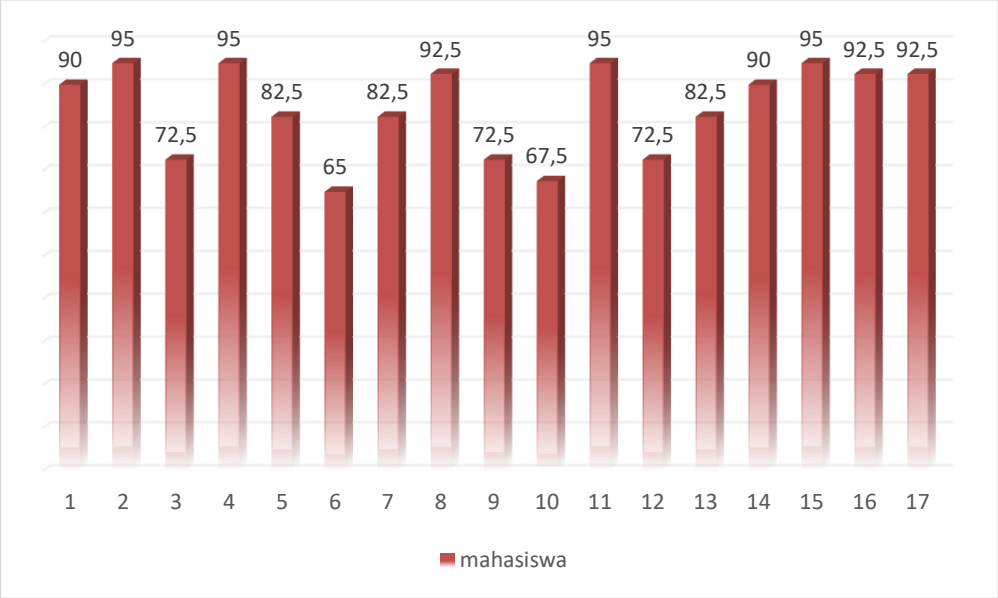

Figure 3. Data Processing of Questionnaire Results

Overview of the need for Jarimatika courses for PET

Jarimatika media is a learning aid for students who use their fingers. Learning to use Jarimatika media can create feelings of joy so that the learning that takes place can make it easier for students to understand the learning material. Mathematics media can be used as an alternative to the difficulties experienced by students when teaching mathematics directly to students in the future. Jarimatika media can also motivate students to learn Mathematics. This is confirmed by research by (Rahayu and Utami 2022) where students feel active and enjoy learning mathematics using mathematics using song creation. Jarimatika also improves students' mindsets and weakens gender stereotypes. Through this *fingering* Students learn multiplication with their fingers. (Hasanah et al. 2022) .

The Jarimatika method also has a positive influence on learning outcomes in multiplication material. This was stated by Dewi (2022) who found that the Jarimatika method improved the learning outcomes of Grade 3 MI students in multiplication calculation operations. Study Marfiah (2023) supports this finding, showing that the use of mathematics using the talking stick method also improves student learning outcomes in multiplication material.

research (2022) emphasizes the differences in the influence of the Jarimatika method on students' numeracy abilities, while Vidiaty (2023) shows the effectiveness of the Jarimatika method with an average N-gain result of 0.60 which is included in the criteria to prove that it is effective in using the method. Jarimatika. Effectiveness here according to (Himmah, Makmur, and Nuraini 2021) can be seen from two aspects, namely effectiveness in terms of process and effectiveness in terms of results. 1) The effectiveness of the process can be seen from the students' activeness and enjoyment in demonstrating the mathematical method of multiplication. 2) The effectiveness of the results can be seen after students can complete multiplication calculations correctly. Students get good grades and no longer experience obstacles in calculating multiplication. The effectiveness of Jarimatika has also been demonstrated for children with special needs. Where based on the analysis (Elita 2012)said that analysis within conditions and analysis between conditions gave positive results, which means that the Jarimatika method is effective in improving the multiplication ability of children who have difficulty learning in class.

This Jarimamatika method can also make students happier and more motivated to improve their multiplication calculation skills because this method can make it easier for students to calculate multiplication (Himmah et al. 2021) . The Jarimatika method can also be applied using online learning, it's just that there are network problems that cause the implementation to not be optimal (Sari and Iskandar 2022) .

However, from several studies, there are several advantages and disadvantages of the aromatics method according to (Acarya 2020) . The advantages are 1) visualization of the calculation process; 2) train the balance of the left brain and right brain; 3) attract children's interest with finger movements; 4) relatively does not burden the brain's memory when used; 5) no need to buy tools, forget them, or forget to save them. The advantages of Jarimatika were also mentioned by (Rahayu, Supriyanto, and Susanto 2022) that it can be felt by children who have weaknesses in memorizing, children can do multiplication using Jarimatika and provide visualization of counting to children.

Meanwhile, the weaknesses are 1) limited mathematical operations that can be completed because of limited fingers; 2) if you don't practice enough, you will slow down your counting compared to an abacus (Acarya 2020). Apart from that, Rahayu et al. (2022) the speed of time in answering test questions, because the calculated mathematical operations are limited and difficult to carry out when multiplication across groups is reached. The opinion of the researchers is that the speed of multiplication calculations will still be helped if the Jarimatika method is given as a basis for solving basic multiplications which students sometimes forget. Meanwhile, for advanced mathematics, we still use the algebraic method as usual.

Some of the results of this research reinforce the importance of MI Basic Mathematics and MI Mathematics courses in studying mathematics. The positive response from students towards learning mathematics using Jarimatika media shows great potential in improving understanding and skills in mathematics, shown by the good score obtained from the average score produced by all students who responded, namely 84% of

the maximum score that can be given, namely 100. Description of students after using Jarimatika media. Of the 7 students interviewed, 5 students were helped by Jarimatika media, while 2 students who had low abilities had difficulty memorizing the Jarimatika techniques. Therefore, it can be concluded that Jarimatika can be used well by PET as curriculum material that must be mastered by PET at IAIN Takengon.

Based on several previous studies and research conducted by researchers, the results show that Jarimatika has an influence on mathematics learning, especially on multiplication material. Therefore, it can be concluded that Jarimatika can be used as an additional subject in the curriculum of the Basic Education Study Program in IAIN Takengon as additional knowledge to equip PET in teaching elementary school mathematics in the future.

D. Conclusion

The results of this research provide an illustration that basic mathematics is given a good category in the analysis of the questionnaire obtained. Jarimatika can be used well by PET as curriculum material that must be mastered by the Basic Education Program Study at IAIN Takengon. This good category is strengthened by interview media which gives the researcher an impression that students feel quite helpful in using mathematics to deepen their learning of multiplication. The need to use Jarimatika media in the curriculum of the Basic Education Study Program is to four studies that show the results that Jarimatika has an influence on mathematics learning, especially in multiplication. Therefore, it can be concluded that mathematics can be used as an additional subject in the curriculum of the Basic Education Study Program as additional knowledge for PET in teaching elementary Mathematics in the future. By having various abilities, students will be ready to face global challenges in conveying knowledge to their students. With the Jarimatika material, it becomes additional knowledge for students to master the various learning methods needed.

The limitation of this research is the lack of in-depth mathematics practice carried out by students. Therefore, it is hoped that research related to Jarimatika can provide breadth in the application of deeper Jarimatika learning practices and provide more complex quantitative research using ANACOVA/MANCOVA. Apart from that, separate outreach was also carried out to students who brought in Jarimatika experts so that students had more complex Jarimatika skills.

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