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Mathematical Reasoning: An Analysis Of Madrasah Ibtidaiyah Teacher Education (PGMI) Novice Teachers' Abilities

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ABSTRACT

Penalaran matematis, yaitu proses pengambilan kesimpulan berdasarkan fakta yang ada, bertujuan untuk memecahkan masalah matematika. Oleh karena itu, kemampuan ini menjadi fondasi penting dalam pembelajaran matematika. Mengingat pentingnya kemampuan penalaran, maka mahasiswa calon guru diharapkan memiliki kemampuan untuk mengembangkan penalaran matematisnya sendiri. Penelitian ini bertujuan untuk menganalisis kemampuan penalaran matematis mahasiswa calon guru SD/MI di Kabupaten Ciamis. Jenis penelitian yang digunakan adalah penelitian deskriptif kuantitatif dan kualitatif. Subjek pada penelitian ini merupakan calon guru sebanyak 21 orang dari program studi Pendidikan Guru Madrasah Ibtidaiyah. Pengambilan subjek menggunakan teknik purposive sampling. Teknik analisis data dengan reduksi data, penyajian data, interpretasi data, dan penarikan simpulan. Penelitian ini memberikan hasil bahwa sebanyak 58% mahasiswa calon guru masih dalam kategori sangat rendah dalam kemampuan penalaran matematisnya. Kemampuan penalaran matematis pada indikator menganalisis situasi matematika mempunyai rata-rata sebesar 69% dengan kategori sedang, selanjutnya pada indikator merencanakan proses penyelesaian 63% pada kategori sedang, menyelesaikan masalah dengan langkah sistematis 57% dalam kategori rendah dan menarik kesimpulan logis 50% dalam kategori sangat rendah.

Mathematical reasoning, which is the process of drawing conclusions based on existing facts, aims to solve mathematical problems. Therefore, this ability is an important foundation in learning mathematics. Given the importance of reasoning skills, prospective teacher students are expected to have the ability to develop their own mathematical reasoning. This study aims to analyze the mathematical reasoning abilities of prospective elementary school teachers in Ciamis Regency. The type of research used is mixed method. The subjects in the research were 21 novice teachers' from the Madrasah Ibtidaiyah Teacher Education study *program*. Subjects were taken using the purposive sampling technique. Data analysis techniques include data reduction, data presentation, data interpretation, and conclusion drawing. The research provides results showing that as many as 58% of novice teachers' are still in the very low category in their Mathematical reasoning skills. Mathematical reasoning ability on indicators of analyzing Mathematical situations has an average of 69% in the moderate category, then on indicators of planning the solution process 63% in the moderate category, solving problems with systematic steps 57% in the low category, and drawing logical conclusions 50% in the very low category.

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INTRODUCTION

Mathematics is a science that is close to everyday life. Mathematics is also one of the subjects that is taught at almost every level of education, from basic education to higher education. This shows that Mathematics is a science need that has an important role in life. Mathematics is required at all levels of education because it is a basic science that is used as a benchmark for the progress of science and technology. Mathematics can be used to develop skills that involve logical, systematic, critical, careful, and creative reasoning abilities in communicating ideas or solving problems (Misnasanti et al., 2017). Mathematics and reasoning ability are two things that are interrelated. This is because Mathematics can be understood through the process of reasoning, and the process of reasoning can be trained through Mathematics learning. In Permendikbud RI Number 37 of 2018 concerning Core Competencies and Basic Competencies for Primary and Secondary Education Units, the ability to reason is stated in the series of learning competencies. Especially in Mathematics learning, the dimension of thinking or Mathematical reasoning is arranged into a special skill that must be mastered by students, especially at the basic education level (Marsitin & Sesanti, 2023).

According to NCTM (2000), there are five standard Mathematical abilities that must be possessed by students, namely: 1) problem-solving ability; 2) communication ability; 3) connection ability; 4) reasoning ability; and 5) representation ability. Reasoning ability is one of the standards of students' Mathematical abilities because reasoning has an important role in understanding Mathematical materials and concepts to be learned (Misnasanti et al., 2017). The reasoning is a person's way of thinking or thinking, while proof is the result of that thought (2). The reasoning or logical thinking means thinking according to the correct rules and having a systematic, valid, and accountable nature. The Program for International Student Assessment (PISA) states that reasoning is a very important aspect of Mathematical ability in the teaching and learning of Mathematics because reasoning, as one of the fundamental Mathematical capabilities, will continue to be a strategic issue in the future (Sukirwan et al., 2018) . Reasoning ability is an essential component that is the aim of education in Indonesia because reasoning is a mental or cognitive activity through logical and analytical thinking (Hidayah et al., 2020). For Mathematics education students who will later become teachers, the ability to reason is the main provision for teaching Mathematics to students. The reasoning process is a cognitive process in obtaining a conclusion that is following the correct rules or agreed-upon truth and can be accepted as truth that can account for a problem faced. The importance of this reasoning ability is that it becomes the goal of school Mathematics learning (Permendikbud, 2016). Mathematical reasoning enables learners, including teachers, to make sense of Mathematics and to actively construct Mathematical ideas (Herbert et al., 2015). Reasoning skills can be developed in the learning process (Masfingatin et al., 2020).

Regarding the reasoning ability of students, referring to the results of TIMSS in 2015 and 2023 shows that in the cognitive domain the percentage of reasoning abilities of Indonesian students is still meager, namely 20% in TIMSS (Hamzah, 2023). This result is the lowest average percentage achieved by Indonesian students in mathematics. Also, several studies have shown that students' reasoning abilities are still low (Darta & Saputra, 2020; Octriana, Putri, & Nurjannah, 2019; Sukirwan, Darhim, & Herman, 2018). The low reasoning ability of students is one of which is determined by teaching activities by the teacher in the classroom, thus required teachers and prospective mathematics teachers. They can develop the reasoning of students in Indonesia. Given the importance of reasoning skills in learning Mathematics, teachers have a major role in fostering Mathematical reasoning skills in students. According to Ridwan (2017) a student teacher must have reasoning skills to learn Mathematics. They must have the opportunity to develop their own Mathematical reasoning as well as their knowledge of reasoning. Of course, to develop the expected ability, novice teachers' must first justify and know the justification of a concept by doing three aspects, namely, doing proof, understanding the nature of proof, and adapting the concept of proof to different levels of development. In learning Mathematics, reasoning ability plays a role in both concept understanding and problem solving. Meanwhile, in everyday life, reasoning skills are useful when solving problems that occur both in the personal, community, and wider scope.

Thus, this situation encourages researchers to analyze the extent of Mathematical reasoning skills possessed by novice teacher'. Current research is supported by previous research. The first previous research was conducted by Miatun & Ulfah (2023) with the title "Mathematical Reasoning Ability of Mathematics Teacher Candidate Students." According to the findings, as many as 63% of students had

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very low Mathematical reasoning abilities. Most students make conjectures that are incomplete. Furthermore, the majority of students don't engage in Mathematical manipulation. Most students present proofs and develop conclusions but are imprecise in their judgment. The second previous research was conducted by Febriyanti et al., (2022) with the title "Exploration of Mathematics Teacher Candidates' Knowledge of Students' Mathematical Reasoning Process." The conclusion is that the knowledge of the reasoning process of novice teachers' is still low. Prospective student teachers must be able to improve their reasoning process knowledge so that they can link various definitions and connect one reasoning process with another. In addition, an important aspect of the reasoning process is to develop knowledge by equipping facilities as a medium to understand the reasoning process in every student's learning. The results of the research can be used to design a framework for prospective teachers' knowledge of students' reasoning processes. Furthermore, the third previous research was conducted by Sukirwan et al., (2018) with the title "Analysis of students' Mathematical reasoning." The results showed that, in general, students still have problems with reasoning. Students tend to imitate reasoning, which means they tend to use routine procedures when dealing with reasoning. It also shows that the traditional approach still dominates in students' daily learning situations.

Based on the three previous studies above, namely the first study conducted by Miatun & Ulfah (2023), the second study by Febriyanti et al., (2022) and the third study by Sukirwan et al., (2018) have similarities with this research, namely to find out what the condition of Mathematical reasoning abilities is. The three research results show that Mathematical reasoning abilities are very low. As for the novelty of the present research is the indicators used. The indicators used in this research include: (1) Analyzing the Mathematical situation (2) Planning the solution process; (3) Resolving problems with systematic steps; and (4) Draw logical conclusions. The indicators used explain the reasoning abilities of novice teachers clearly and in detail for each step taken. So that in this study we can see a specific analysis of the contribution of each indicator, which was not available or used in previous studies. Moreover, in the district Ciamis no research has been carried out. However, three previous studies were used as a reference for this research.

Based on the background that has been stated previously, the problem formulation in the research is "How is the Mathematical reasoning ability of novice teachers' abilities?". Based on the problem formulation, the aim of this research is to find out the extent of the Mathematical reasoning abilities of novice teachers' abilities. Furthermore, the findings of this study are expected to provide significant practical implications. Specifically, providing information on the abilities of prospective teachers on mathematical reasoning indicators for the design and implementation of teacher training in Ciamis Regency. And can increase the effectiveness of prospective teachers in facilitating students' mathematical reasoning abilities.

METHODS

This research used mixed methods so that researchers gain a deeper and more comprehensive understanding of the research conducted. Quantitative data provides an overview and pattern, while qualitative data provides context and more detailed explanations. So that researchers are able to compare and confirm findings from various perspectives. The research was conducted at Ciamis Regency. The subjects in the research were 21 novice teachers' of the Madrasah Ibtidaiyah Teacher Education study program. The purposive sampling technique was used to select subjects in the research. Where researchers select samples based on criteria that are considered relevant, namely the ability to provide the required data. The instrument given is a Minimum Competency Assessment (AKM) question. AKM is part of the National Assessment which aims to measure students' cognitive abilities comprehensively. So that the instrument used is valid and reliable. The selected subjects were then given a Mathematical reasoning ability test, and then semi-structured interviews were conducted on several subjects. The auxiliary instruments in this research are Mathematical reasoning ability test instruments and interview guidelines. The Mathematical reasoning ability test consists of 6 essay questions. The indicators will be described based on indicators of reasoning by Vebrian et al., (2021) (1) Analyzing Mathematical situations (2) Planning the solving process; (3) Solving problems with systematic steps; and (4) Drawing logical conclusions. Mathematical reasoning questions are given an assessment based on the scoring guidelines described in Table 1.

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Table 1. Scoring for Mathematical reasoning ability

No	Reasoning Indicators	Scor	Criterias
1	Analyzing Mathematical situations	1	If the student cannot write what is known and what is asked from the question, but inappropriate
		2	If the student can write what is known and what is asked from the question but inappropriate
		3	If the student can write what is known and what is asked from the question with appropriate
		4	If the student can write what is known and what is asked from the question with appropriate
2	Planning the solving process	1	If the student cannot estimate the solving process
		2	If the student can estimate the solving process but inappropriate.
		3	If the student can estimate the solving process appropriately
		4	If the student can estimate the solving process very appropriate
3	Solving problems with systematic steps	1	If students cannot solve problems with systematic steps
		2	If the student can solve the problem with systematic steps but inappropriate
		3	If students can solve the question with systematic steps with appropriate
		4	If students can solve the question with systematic steps and very appropriate
4	Drawing logical conclusions	1	If the student cannot draw a logical conclusion
		2	If the student can draw a logical conclusion but it is inappropriate
		3	If the student can draw a logical conclusion with appropriate
		4	If the student can draw a logical conclusion very appropriately

Furthermore, the results of the Mathematical reasoning ability test are categorized into five criteria, as shown in Table 2 (Vebrian et al., 2021). In addition, the results of scoring the Mathematical reasoning ability test are converted into percentage form, and the interval of each criterion is presented in Table 2 below:

Table 2. Categories of Mathematical reasoning ability

Criterias	The interval
Very high	86-100
High	76-85
Medium	60-75
Low	55-59
Very low	0-54

Test results were analyzed based on mathematical reasoning indicators. Test results that meet the criteria for mathematical reasoning are then conducted interviews based on test results to find out more about mathematical reasoning indicators. The data analysis steps taken in this research (Moleong, 2013) include: (1) data reduction, preparing the necessary data and eliminating data that are not needed for analysis; (2) categorization and synthesization, namely data that has been reduced is categorized, presented, and synthesized; and (3) conclusion drawing, namely data that has been presented previously will be analyzed based on indicators of Mathematical reasoning ability tests and then drawn final conclusions. The data of the written test results and the subsequent interviews were tested for validity

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by triangulation of techniques, which combines the results of the test data essay and interviews based on the test results.

RESULT AND DISCUSSION

The Mathematical reasoning ability test was given to 21 PGMI novice teachers' at STAI Putra Galuh Ciamis. This Mathematical reasoning ability test is carried out by giving 6 essay questions that have been prepared based on indicators of Mathematical reasoning ability. After analyzing the Mathematical reasoning ability of prospective teachers' answers according to the scoring in Table 1, they were then grouped according to the criteria in Table 2. The results of categorizing the Mathematical reasoning ability of each indicator are presented in Table 3.

Table 3. Data on Mathematical Reasoning Ability Results

Criterias	Interval	Total Students	Percentage
Very high	86-100	1	5%
High	76-85	1	5%
Medium	60-75	5	26%
Low	55-59	3	16%
Very low	0-54	11	58%
Total		21	100%

Based on Table 3 above, it can be seen that most of the Mathematical reasoning skills of prospective teachers are in the very low category, namely 11 people with a percentage of 58%, as many as 3 people in the low category with a percentage of 16%, and 5 people in the medium category with a percentage of 26%. Meanwhile, in the very high and high categories, there is only one person who is in the percentage of 5%. The results of the research are in line with (Muhammad, 2017), who states that the Mathematical reasoning ability of novice teachers' is still in the lower category. Furthermore, the results of the Mathematical reasoning ability test were also converted into percentages for each indicator of Mathematical reasoning ability. The conversion results in percentage form are presented in Table 4.

Table 4. Mathematical Reasoning Ability of novice teachers' Per Indicator

Mathematical Reasoning Indicator	Question Number						Average
	1	2	3	4	5	6	
Analyzing Mathematical situations	67% Low	79% High	79% High	40% Very Low	76% High	75% Medium	69% Medium
Planning the Completion process	56% Low	73% Medium	74% Medium	38% Very Low	73% Medium	68% Medium	63% Medium
Solving problems with systematic steps	50% Very Low	64% Medium	64% Medium	38% Very Low	63% Low	61% Low	57% Very Low
Drawing logical conclusions	44% Very Low	61% Medium	60% Medium	32% Very Low	55% Medium	51% Medium	50% Medium
Average per question	54%	69%	69%	37%	67%	64%	60%

Based on Table 4, it can be seen that the average mastery of Mathematical reasoning ability indicators shows that the indicator of analyzing Mathematical situations has an average of 69% in the medium category. Furthermore, the indicator of planning the solution process is 63%, solving problems with systematic steps is 57% in the low category, and drawing logical conclusions is 50% in the very low category. Apart from being based on indicators, researchers can also see the Mathematical abilities of teachers based on the questions. Mathematical reasoning ability questions that are considered difficult are question number 4 with a percentage of only 37% and question number 1 with a percentage of 54%. Both questions are classified in the very low category of Mathematical understanding. The medium questions are question number 2 (69%), question number 3 (69%), question number 5 (67%), and

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question number 64%. The four questions are included in the medium category for the Mathematical understanding of novice teachers'.

Most of the Mathematical reasoning skills of novice teachers' are in the very low category. The results of the research are in line with (Khasanah & Sutama, 2015), who state that students with high abilities also have good Mathematical reasoning skills, inversely proportional to students with low abilities, who are very lacking in the Mathematical reasoning process. In line with the research conducted by (Feriyanto & Imanah, 2023), which states that students' Mathematical reasoning skills are still lacking. This is also supported by research (Adamura & Susanti, 2018) which states that students' Mathematical reasoning skills are less than perfect. The results of the research indicate that there is still a need to improve the Mathematical reasoning skills of novice teachers'.

Analysis of the Mathematical reasoning ability of prospective teachers based on the Mathematical reasoning ability test questions:

The Mathematical reasoning ability test, Question Number 1

Here is question number 1.

"Living humans need food. From food, humans obtain energy called calories. Here is the calorie content of an egg. If Abi wants to get 178 calories, he has prepared one boiled egg white to eat. The egg he should prepare again to eat is ..."

Based on the analysis of prospective teachers' answers, Mathematical reasoning ability question number 1 is in the very low category. This can be seen from the average percentage of Mathematical reasoning ability of 54%. The following are the results of the answers of novice teachers' in subject 1.

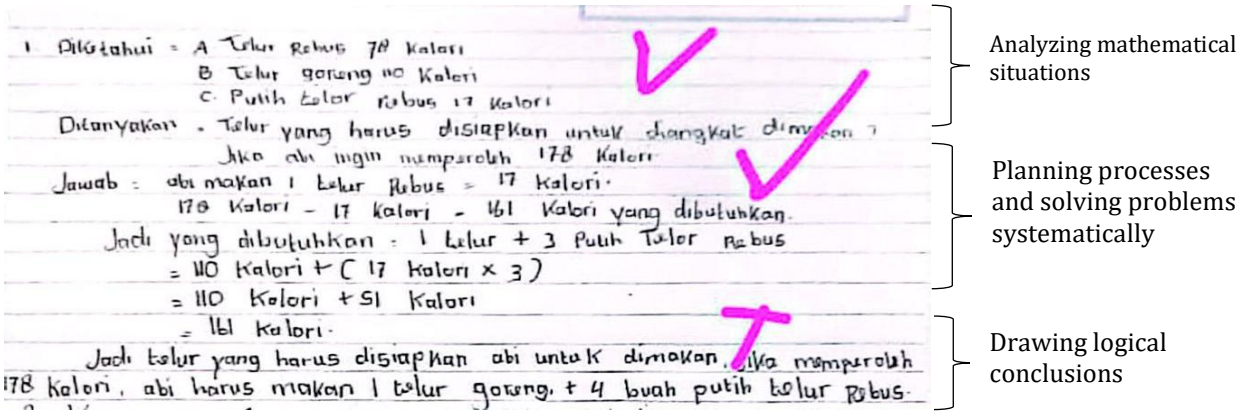

Figure 1. S1 results on the Mathematical reasoning ability test question number 1

Figure 1 is the answer to subject 1 (S1), where S1 is less precise in drawing conclusions. This is in line with the results of the data in Table 4, where the indicator in drawing conclusions is 44%, including a very low category. While the ability to analyze Mathematical situations in the medium category is 67%, this can also be seen from the answers written by novice teachers'. S1 has been able to complete indicator 1, namely analyzing the problem situation by writing what is already known in the problem. In addition, S1 has also been able to plan the solution process and solve problems with systematic steps. However, in the last indicator in drawing conclusions, S1 has not concluded the problem correctly; this is evident from the results of the solution, namely 4 egg whites and 1 fried egg. These results are reinforced by the results of interviews with S1. Here:

P : Do you understand question number 1?

S1 : Yes, I understand. From the question, what must be sought is the egg that Abi must prepare to eat in order to obtain 178 calories.

P : Can you find the answer?

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S1 : Yes, I can get from the results of the calculations that have been done that Abi needs 4 egg whites and 1 fried egg to eat in order to get 178 calories.

The Mathematical reasoning ability test, Question Number 2,
Mr. Andi is a business. He opened a restaurant with the name "Chicken noodles and Meatball Mr. Andi". Here's a list of menus and prices at Resto Mr. Andi:

No.	Menu	Harga
1	Regular chicken noodles	Rp13.000,00
2	Egg meatball chicken noodles	Rp19.000,00
3	Complete meatball	Rp16.000,00
4	Super big meatball	Rp23.000,00
5	Special beef meatball	Rp23.000,00
6	Egg-filled meatballs	Rp13.000,00
7	Mixed ice	Rp10.000,00
8	Avocado juice	Rp10.000,00
9	Sweet iced teas	Rp6.000,00
10	Mineral water	Rp4.000,00

A customer ordered several portions of meatball and several packs of mixed ice. The customer pays with a bill of Rp100,000 and gets a change of Rp34,000. Determine the possible purchases that the buyer made (at least 3 possible answers).

Based on the analysis of prospective teachers' answers, question number 2 is in the medium category. This can be seen from the average percentage of Mathematical reasoning ability of 69%. The following are the results of the answers of novice teachers'[1] in subject 2.

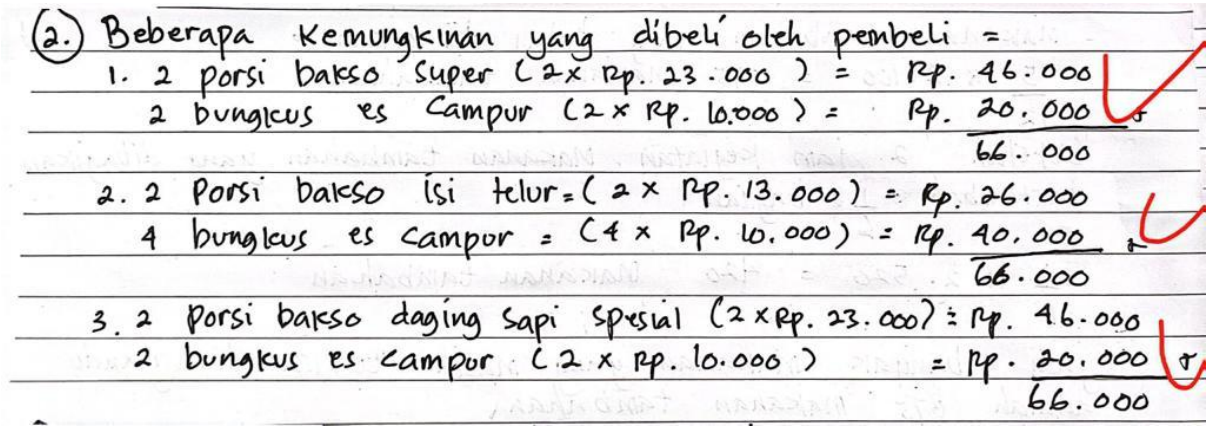

Figure 2. S2 results on the Mathematical reasoning ability testquestion number 2

Figure 2 is the answer to subject 2 (S2), where S2 can already plan the solution process and solve the problem with systematic steps. However, in the last indicator of inference, S2 has not concluded the problem.

P : Do you understand problem number 2?
S2 : Yes, I understand. From the question, what must be sought is the possibility that the buyer buys a piece of money worth Rp100,000.00 and gets a change of Rp34,000.00.
P : Can you find the answer?
S2 : Yes, I can get it from the results of the calculations that have been done. There are 3 possibilities: the first is that the buyer buys 2 servings of super meatballs and 2 packs of mixed ice; the second possibility is buying 2 servings of egg-filled meatballs and 4

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packs of mixed ice; and the last possibility is buying 2 servings of special beef meatballs and 2 packs of mixed ice.

P : But why didn't you write the conclusion?

S2 : I forgot, even though I can.

The Mathematical reasoning ability test, Question No. 3

The school library receives donations of books from parents. 30% are fiction storybooks, 0.25 are textbooks, and the rest are encyclopedia books. How many of the donated books are encyclopedia books?

Based on the analysis of novice teachers' answers, the Mathematical reasoning ability test question number 3 is in the medium category. This can be seen from the average percentage of Mathematical reasoning ability of 69%. The following are the results of the answers of novice teachers' in subject 3.

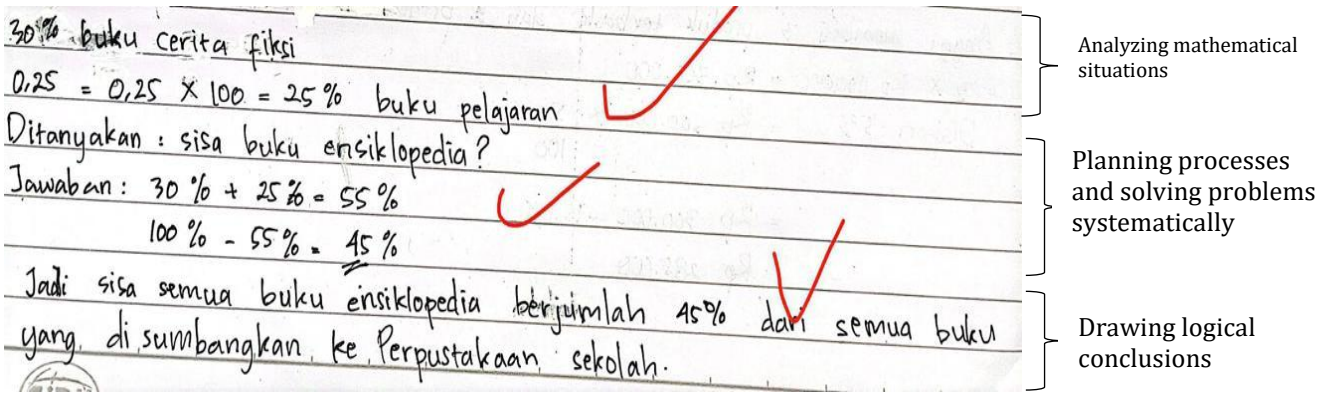

Figure 3. S3 results on the Mathematical reasoning ability test question number 3

Figure 3 is the answer to subject 3 (S3), where S3 can already plan the solution process and solve problems with systematic steps. In addition, S3 has also been able to draw logical conclusions appropriately.

The Mathematical reasoning ability test, Question No. 4

At a posyandu activity in a village, supplementary feeding for toddlers was conducted. In the village, there are 210 children under five. Each child will get 12 kinds of additional food. However, the amount of supplementary food available that day was only 5/6 of it. After 1 hour of the activity, the amount of additional food distributed to toddlers looks like the following figure:

Description:

Description:Red-colored box: Supplementary food that has been distributed to toddlers.White box: Supplementary food that has not been distributed.

After 2 hours of activity, the amount of extra food distributed increased by 1/6. The amount of additional food that remains in the posyandu is.

Based on the analysis of novice teachers'[2] answers, question number 4 is in the very low category. This can be seen from the lowest average percentage of Mathematical reasoning ability of all questions, which is only 37%. The following is the answer to student teacher subject 4 (S4).

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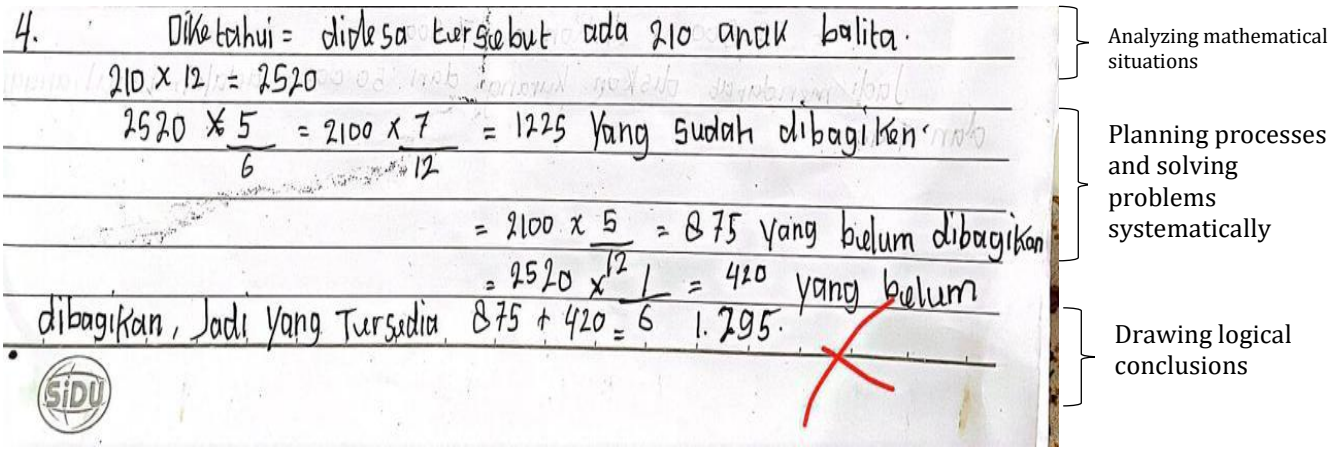

Figure 4. S4 results on the Mathematical reasoning ability test question number 4

From the work of subject 4, subject S4 has not been able to solve the problem given correctly but is able to write down the information in the problem. From the results of the interview, the subject stated that he still could not understand the basic concepts of fractions and fraction problems in everyday life, so S4 could not solve the problem correctly. It is very important to know the concept of fractions, especially when equalizing the denominator, because it affects the next solution. Students have difficulty determining the working operation as students do. This is in line with research (Khasanah & Sutama, 2015), which states that an error is caused by ignorance of the concept because, to understand the meaning of the problem that has been presented, the subject must master the material and know the concepts related to the problem. If the student does not have sufficient knowledge needed to solve the problem, they will automatically have difficulty solving the problem given.

The Mathematical reasoning ability test, Question No. 5

Apart from saving money, we can also save gold. Gold was chosen because its price tends to rise over time. Saving gold used to require a large amount of capital. Now there is "Mini Gold" or gold with a small size, so saving gold can be done with a small amount of capital.

Mini Gold Price List
Date: November 12, 2023

PIECES	PRICE (selling price to the consumer)
0,05 gram	Rp74.000,00
0,1 gram	Rp138.000,00
0,25 gram	Rp316.000,00
0,5 gram	Rp592.000,00

Calculate, please!

a. Ms. Dewi has a 1 gram gold mini that consists of several gold pieces. What is the weight of the gold pieces that Ms. Dewi may have?
b. The cheapest cost to buy a 0.6 gram mini gold piece is?

Based on the analysis of prospective teachers' answers, question number 5 is in the medium category. This can be seen from the average percentage of Mathematical reasoning

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ability which is 67%. The following are the results of the answers of novice teachers'[3] subject 5 (S5).

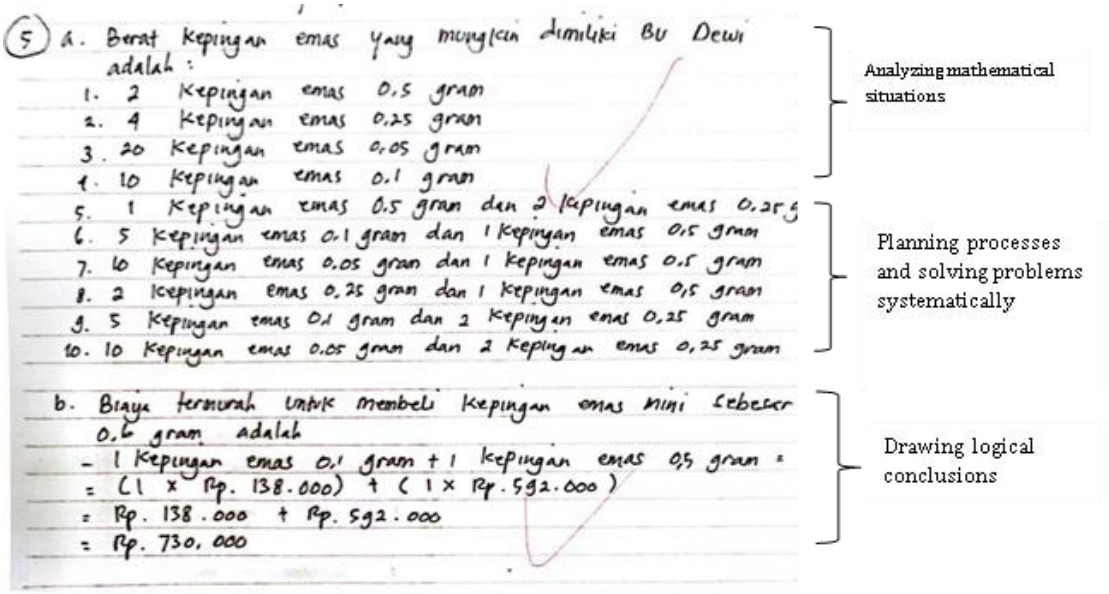

Figure 5. S5 results on the Mathematical reasoning ability testquestion number 5

Figure 5 is the answer of subject 5 (S5), where S5 has been able to plan the solution process and solve the problem with systematic steps. In addition, S5 has also been able to draw logical conclusions correctly.

The Mathematical reasoning ability test, Question No. 6

The distributor shop "Murah Meriah" is a shop that produces its own goods to be sold, such as bags, clothes, wallets, and shoes. The store provides special prices for buyers who buy more items in the form of discounts, as follows:.

Discounted Today Only
Best Products
(Rp 100.000.00/Item)
Buy 3, discount 5%
Buy 5, discount 10%
Buy 10, discount 20%
Favorite Product
(Rp.50.000,00/Item)
Buy 3, discount 4%
Buy 5, discount 9%
Buy 10, discount 19%
On that day, some buyers made the following transactions:

Nurul bought 2 best products and 3 favorite products.
Anggi bought 3 best products and 2 favorite products.
Zakia bought 5 best products and 3 favorite products.
Tere bought 3 best products and 5 favorite products.

Based on this information, the buyer who gets a discount of less than Rp50,000,000 is?

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Based on the analysis of novice teachers'[4] answers, question number 6 is in the medium category. This can be seen from the average percentage of Mathematical reasoning ability of 64%. The following are the results of the answers of novice teachers'[5] subject 6.

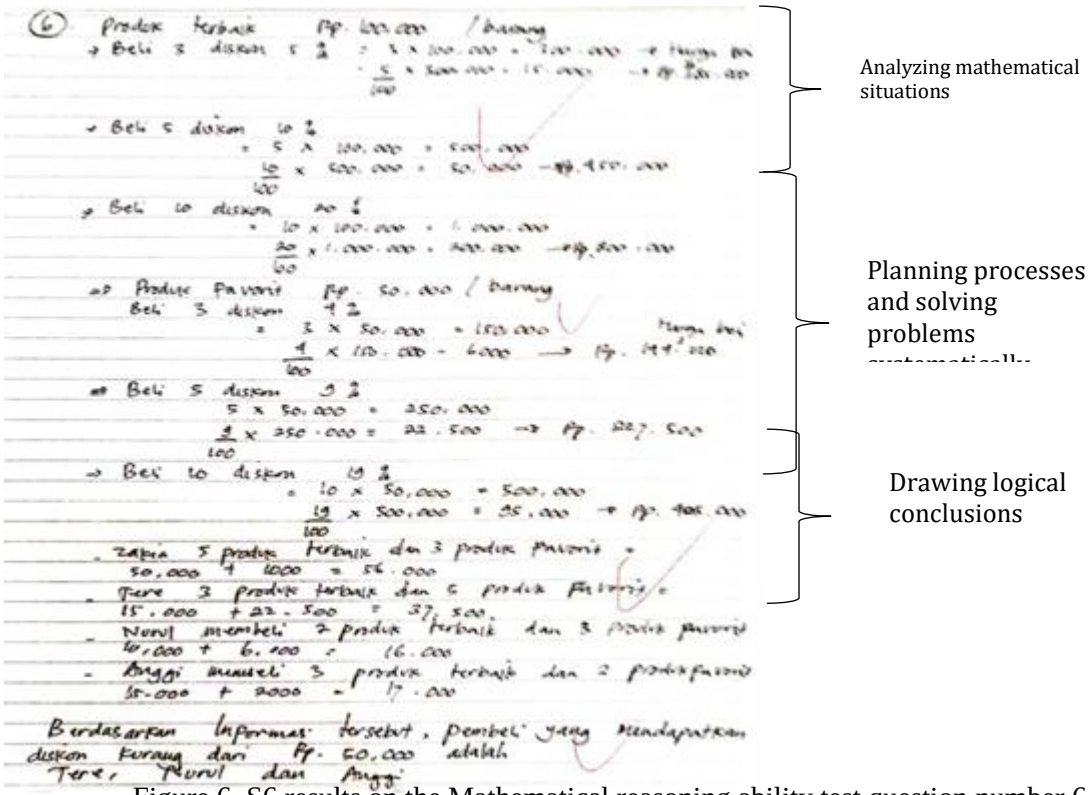

Figure 6. S6 results on the Mathematical reasoning ability test question number 6

Figure 6 is the answer of subject 6 (S6), where S6 has been able to plan the solution process and solve the problem with systematic steps. In addition, S6 has also been able to draw logical conclusions correctly. This is in line with research conducted by (Konita et al., 2019)Reasoning is a thinking process that is carried out in a way to draw conclusions. The conclusion resulting from reasoning is based on the observation of previous data that has been tested. Reasoning, according to (Konita et al., 2019) is a thought taken to make statements and reach conclusions in task completion. The statement about the importance of having Mathematical reasoning skills was also put forward by (Isnaeni et al., 2018). The importance of Mathematical reasoning can directly improve student learning outcomes, namely if students are given the opportunity to use their reasoning skills in carrying out conjectures based on their own experiences, so that students will easily understand a concept.

As for the novelty about present research is focuses on the contex of Madrasah Ibtidaiyah, which has different characteristics and needs compared to general elementary schools. Second, this research conducted an in-depth analysis of various aspects of Mathematical reasoning, including logical thinking skills, problem solving, and Mathematical representation, in the context of Madrasah Ibtidaiyah teacher education. Third, this research does not only focus on cognitive aspects, but also pedagogical, such as learning strategies and the role of teachers in developing students' Mathematical reasoning abilities. Fourth, this research is expected to produce practical implications for the development of Madrasah Ibtidaiyah teacher education programs in improving the Mathematical reasoning abilities of novice teachers'[6]. Futhermore, this research is expected to make a significant contribution to the development of Mathematics education at Madrasah Ibtidaiyah by increasing understanding of Mathematical reasoning in the context of Madrasah Ibtidaiyah teacher education, providing input for

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the development of more effective teacher education programs, and ultimately, improving the quality of M athematics learning at Madrasah Ibtidaiyah.

CONCLUSION

From the results of data analysis in the discussion presented above. The researchers concluded that 58% of novice teachers' were still in the very low category in their Mathematical reasoning ability. Mathematical reasoning ability on indicators of analyzing Mathematical situations has an average of 69%. The highest percentage is seen in the ability to analyzing situations. This indicates that most prospective teachers have quite good abilities in understanding and identifying important elements in a mathematical problem. They are able to analyze the information given and recognize the context of the problem. Furthermore, in the indicator of planning the solving process 63%. The ability to plan the soving process is below the ability to analyzing the situation. This shows that after understanding the problem, most novice teachers' are able to formulate the steps or strategies needed to solve the problem. However, this percentage is lower, indicating that some novice teachers' may still need reinforcement in designing an effective and efficient resolution flow. Solving problems with systematic steps 57% in the low category. This percentage shows a further decline in the ability to solve problems with systematic steps. Although they have been able to plan, not all novice teachers' are able to implement the plan in a coherent and organized manner. This can be caused by a lack of accuracy in calculations, a lack of understanding of the concepts underlying each step, or difficulty in managing the stages of completion. And drawing logical conclusions 50%. The ability to draw conclusions shows the lowest percentage among all indicators. This indicates that half of the novice teachers' still have difficulty in interpreting the results of calculations or solutions obtained to then draw conclusions that are relevant to the initial problem. This ability is crucial because it shows a deep understanding of the process and results of problem solving as a whole.

The implication of the results of this study is the need for efforts to improve the quality of mathematics learning for novice teachers'. Teacher education programs need to place greater emphasis on developing the ability to plan effective problem solving, practice systematic and careful problem solving steps, and accustom novice teachers'to interpret results and draw appropriate conclusions. Improvements in these aspects will equip prospective teachers with a stronger foundation of mathematical reasoning, which will ultimately have a positive impact on the quality of mathematics learning in schools.

In addition, potential future research directions can further explore the thinking process and mathematical reasoning strategies used by novice teachers with different levels of ability. As well as how affective factors, such as math anxiety and self-confidence, affect the mathematical reasoning abilities of novice teachers need further attention.

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