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Junior High School Students' Numeracy in Solving Number Content AKM Problems Based on Mathematical Ability

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Abstract: Numeracy is essential for students to utilize their basic mathematical skills optimally and be more critical in receiving and processing information. However, facts in the field show that students still need help understanding the concept of numeracy. This research aims to describe junior high school students' numeracy in solving AKM questions with number content based on mathematical ability. This research uses a qualitative approach with a descriptive research type. For the research subjects, the researchers chose three class VII junior high school students with different levels of mathematical ability (high, medium, low) by paying attention to their communication skills. Researchers used TKM, numeracy tests, and interviews to collect data. The TKM was used as a reference to determine the analyzed research subjects based on the scoring guidelines. The numeracy test and interview results were analyzed using three stages of qualitative data analysis: data condensation, data presentation, and conclusion. The numeracy test results and video-recorded interviews were analyzed by taking important parts by coding them and then presenting them in figures and tables. The results of this study show that students with high mathematical abilities could fulfill the seven basic mathematical abilities in completing the numeracy test. Students with moderate mathematics abilities only fulfilled six basic mathematics abilities in completing the numeracy test. The basic mathematical abilities that cannot be fulfilled were the ability to use language and symbolic operations because students make calculation errors. Then, students with low mathematics ability could only fulfill some numeracy indicators to solve the problem. Students with low mathematical abilities needed help communicating the process of solving writing or orally. Students could not change the context of the mathematical model and did not change the information or equations presented. In completing the numeracy test, students with low mathematical ability could not make patterns and relationships and made calculation errors.

INTRODUCTION

21st-century learning emphasizes the importance of 4C skills: critical thinking, communication, collaboration, and creativity (Fajriyah, 2022). There is information in everyday life that requires mathematical competence to understand the content of the information, such as in education, health, economic, and social aspects (OECD, 2019). To be a reflective individual in the 21st century, one needs the ability to make decisions (OECD, 2019; Kemendikbud, 2020). The skill in question is numeracy.

Numeracy is a person's ability to think using mathematical concepts, procedures, facts, and tools to solve everyday problems in various contexts relevant to individuals as citizens

of Indonesia and the world (Purwanto, 2021). According to Mariamah et al. (2021), numeracy is the ability to use various numbers and symbols related to basic mathematics to solve everyday problems and analyze information displayed in various forms (graphs, tables, charts, etc.). Numeracy is the capacity of individuals to formulate, use, and interpret mathematics in various contexts, including mathematical reasoning and using mathematical concepts, procedures, facts, and tools to describe, explain, and predict phenomena or problems (OECD, 2019).

In solving numeracy, a series of basic math skills underlie each process. As an individual's numeracy level increases, that individual can utilize basic mathematical skills at an increasing rate (Turner et al., 2013). The three mathematical processes use These essential math skills at different levels (OECD, 2019). From the definition of numeracy above, it can be concluded that numeracy is a person's ability to use basic math skills to solve problems in various contexts in everyday life. Numeracy is critical for students to access and understand the world, equip students with awareness and understanding of the critical role of mathematics in the modern world (Susanto et al., 2021).

Based on this interest, the Organization for Economic Cooperation and Development (OECD) established the Programme for International Student Assessment (PISA) to conduct assessments that measure student numeracy. Based on the PISA results, Indonesia's numeracy from year to year has remained relatively high (OECD, 2019). To overcome the low numeracy skills of Indonesian students, the government, through the education policy of the Ministry of Education, Culture, Research and Technology, has followed up by establishing a new education quality improvement evaluation program, namely the National Assessment, one of whose components is the Minimum Competency Assessment (AKM) in 2021 (Syafriah & Hadi, 2023).

AKM not only measures mastery of knowledge materials by the curriculum but is specifically designed to determine the overall quality of education and improve the quality of education that still needs to be improved (Kemendikbud, 2020a). To ensure that AKM can measure the competencies and numeracy needed by students, AKM questions measure various content or topics, various contexts, and several levels of students' cognitive levels (Kemendikbud, 2020b).

The use of context is essential in numeracy AKM so that students can recognize the role of mathematics in everyday life (Kemendikbud, 2020b). However, because many students still need to become more familiar with AKM problems, students are still not used to solving problems that have context (Monica & Retta, 2024). Research conducted by Arofa and Ismail (2022) shows that students need help to work on personal context problems at the cognitive level of reasoning.

The number content is one of the materials tested in AKM numeracy. Several previous studies have shown various difficulties and errors junior high school students face in solving math problems on number material. Laksono and Pramesti (2022) described students' errors in solving math problems on integer material due to unsystematic work

steps and errors in calculation operations. Murtiyasa and Wulandari (2020) describe student errors in solving story problems on fractional number material; student errors occur in the calculation process because students do not understand the problem and cannot determine the operation used to solve the problem. There are several student errors in solving problems related to fraction material; the causes include a lack of student interest in learning, a lack of effort in working on the problems given, and a lack of mastery of prerequisite material (Suardi et al., 2022).

According to Baharuddin et al. (2022), students' mathematical abilities can be seen from the results of previous student learning, which means that students' mathematical abilities are seen from mastery of prerequisite material. Therefore, students are expected to hone their initial abilities or prerequisite material because it is inevitable that every material that has been learned will be related to the material that will later be learned (Hevriansyah & Megawanti, 2017). The Mathematical ability affects mathematical solutions; the mathematical ability of each student is always different so that it can be categorized (Isro'il & Supriyanto, 2020). These categories consist of high math ability, medium math ability, and low math ability.

Related to numeracy, based on the results of the numeracy skills of the Indonesian Education Report Card in 2023, it shows that the learning outcomes of junior high school/ MTs/equivalent students are still below the minimum competency, only 40.63% of students have numeracy competencies above the minimum, which means 59.37% of students have not yet reached the minimum competency (Kemdikbud, 2023). Napsiyah et al. (2022) researched numeracy related to geometry and measurement topics with a review of cognitive levels in junior high school students. Sanvi and Diana (2022) also conducted numeracy research but used the topic of algebra using the PISA framework and initial math ability as a review. Then Syafriah and Hadi (2023) and Anggraini and Setianingsih (2022) examined the same thing but used AKM questions with the subject matter of all the content in AKM numeracy, and no review was used. However, there are still rare studies that specifically discuss student numeracy in solving AKM questions on number content. Number content is one of the essential materials because it contains basic knowledge about mathematics (Hakim, 2023). Numbers are a mathematical concept used in enumeration and measurement that is useful and close to everyday life (Bongga & Listiani, 2020).

Based on the previous explanation, the researcher is interested in conducting a study titled ''Junior High School Students' Numeracy in Solving Number Content AKM Problems Based on Mathematical Ability''.

METHOD

This study used a qualitative approach to the research objectives, namely, to describe the numeracy of junior high school students in solving AKM problems on number content in terms of mathematical ability. The subjects selected in this study were three grade VII/7th grade students with different levels of mathematical ability (high, medium, low) by selecting communicative students.

The data collection techniques used in this study were interviews and written tests consisting of the Mathematics Ability Test (TKM) and numeracy tests. The TKM contains five description questions adapted from the Asesmen Sumatif Akhir Jenjang (ASAJ) of mathematics subjects at the elementary/equivalent level. The material used in the TKM has been studied: whole number operations, fractions, decimals, and percents, and sorting numbers in different forms. The numeracy test used in the form of AKM questions on number content adapted from Wulandari's research (2022) by readjusting the stimulus, namely changing the IMT and BMR calculation formula used so that all number operations appear and the formula used is more contextual to the research location.

TKM in this study was used to determine students' mathematical abilities and group students into high, medium, and low mathematical ability groups. Categorization is based on the hypothetical mean and standard deviation (Azwar, 2012). The following is a table categorizing mathematics ability levels in this study.

Table 1. Categorization of Mathematics Ability Level

Interval	Category
$x \geq 79$	High
$39 \leq x < 79$	Medium
$x < 39$	Low

The three selected subjects will be given a numeracy test. The numeracy test instrument describes students' numeracy in solving AKM questions on number content. After completing the numeracy test, the subject will be interviewed. The interview aims to explore and complete the required data not identified from the written results. The numeracy test and interview results were analyzed using three stages of qualitative data analysis: data condensation, data presentation, and conclusion drawing. The following are the numeracy indicators in this study, adapted from OECD 2019.

Table 2. Numeracy Indicators

Indicator	Sub-Indicator	Code
Communications Ability	Communicate the process to solve in written or oral form.	KK1
	Conclude the math result.	KK2
Mathematization Ability	Converting contextual problems to mathematical models or vice versa.	KM1
	Solve problems using context understanding.	KM2
Representation Ability	Modify diagrams, graphs, drawings, equations, or other mathematical expressions presented.	KR1
	Solve mathematical problems using diagrams, graphs, drawings, equations, or other mathematical expressions presented.	KR2
Reasoning and Argument Ability	Determine patterns and relationships to solve problems.	KP1
	Give reasons for patterns and relationships made.	KP2
	Infer from a statement and explain logically.	KP3
	Provide logical mathematical arguments.	KP4
Ability to Choose Strategies to Solve Problems	Identify the problem.	KS1
	Determine a strategy to solve the problem.	KS2
	Plan the solution appropriately.	KS3
Ability to Use Symbolic, Formal, and Technical Language and Operations	Use mathematical symbols by performing calculations with formal symbols.	KB1

Indicator	Sub-Indicator	Code
Ability to Use Math Tools	Use math tools when appropriate to solve problems.	KA1

The interview was conducted after the research subject did the numeracy test. The numeracy test results were used as a foothold in conducting interviews. The interview aims to explore and complete the required data not identified from the written results.

RESULT AND DISCUSSION

The following are the results and data analysis of the numeracy research on seventh-grade students' solving AKM questions on number content based on mathematical ability.

High Mathematical Ability

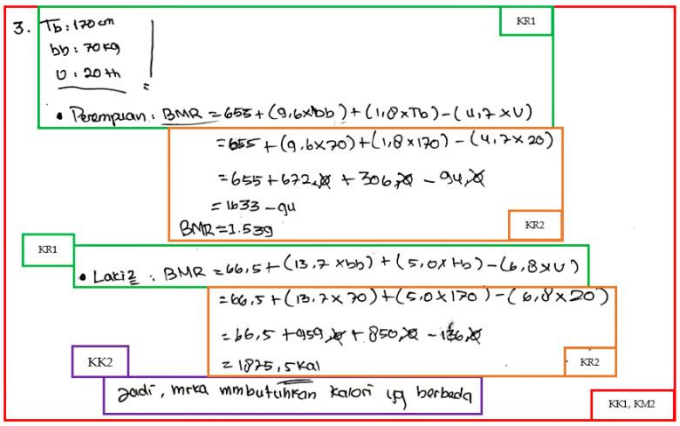

Figure 1. ST Work Result

Communication Ability

The following are excerpts of an interview with ST at the communication ability indicator.

PT.01 : Do you agree with the statement in this question?
ST.01 : Disagree ***(KK2)****.*
PT.02 : Why?
ST.02 : After I calculated the BMR values of men and women, they were different ***(KK2)****.*
PT.03 : The question says calorie count, not BMR!
ST.03 : Since the BMR value is already different, the caloric needs must also be different ***(KK2)****.*

Based on Figure 1 and the results of the interview, she could write down the process of reaching the solution. ST worked by assuming the same height, weight, and age for boys and girls. The equation was inputted into the BMR formula to get the BMR value. Referring to the interview results, ST also concluded that the calorie needs of the two children are different even though they have the same age, height, and weight because the BMR values are different.

Mathematization Ability

The following are excerpts from an interview with ST on indicators of mathematization ability.

PT.04 : This question is about what?
ST.04 : Regarding the calculation of daily calorie needs, they were asked whether or not they agreed with the statement.
PT.05 : How did you convert the problem into a mathematical model?

ST.05 : At first, I read and understood the question; in the question, there was a statement that if the caloric needs were the same, then I would later work on it using the equation or formula BMR ***(KM1)****.*

Referring to the interview results, ST could explain that the numeracy test question number 3 is related to calorie needs; ST changed the problem into a mathematical model by reading and understanding the question first and then working with the appropriate formula. The formula used by ST is the formula for determining BMR. Then, as seen in Figure 1, ST solved the problem by using the context understanding he understood; ST solved the problem quite coherently.

Representation Ability

Based on SR's work in Figure 1 above, ST could convert the information in the problem into equation form through writing. ST chose the correct equation to find out the daily calorie needs. In addition, ST could also solve the problem using the chosen equation well. She correctly input the values of body weight, height, and age, which have been generalized into the BMR equation.

Reasoning and Argument Ability

The following are excerpts of interviews with ST on the reasoning and argument ability indicators.

PT.07 : Explain why you can write the answer like this!
ST.07 : Yes, I first suppose that his height is 170 cm, his weight is 70 kg, and he is 20 years old ***(KP1)****.*
PT.08 : Should it be generalized like that?
ST.08 : The numbers are free as long as the boys and girls are of the same age, weight, and height to match the statement ***(KP2)****.*
PT.09 : Then what is your final answer?
ST.09 : I'm afraid I have to disagree with his statement ***(KP3)****.*
PT.10 : The reason?
ST.10 : After I calculate the BMR, it's different, so the calorie needs must be different. So, not all ages, heights, and weights have the exact caloric needs ***(KP4)****.*

Referring to the interview results, ST explained that to work on this numeracy test question, he first memorized his age, height, and weight (KP1). Her height, weight, and age were free if the initials used for males and females entered into the formula were the same (KP2). ST could also conclude a statement and explain it logically (KP3). The conclusion of ST disagreed with the statement because the BMR value after the calculation is different, so the caloric needs must be different (KP4).

Ability to Choose Strategies to Solve Problems

The following are excerpts of interviews with ST on indicators of the ability to choose strategies to solve problems.

PT.07 : I see from your work that you should have written in detail what is known and asked in the problem. Can you explain?
ST.07 : What is known is the statement that there are two twin boys and girls of the same height and weight who will need the same number of calories every day. Here, I assume the body weight is 70 kg, the height is 170 cm and the age is 20 years old. The question is whether or not you agree with the statement ***(KS1)****.*
PT.08 : Then what did you solve it like?
ST.08 : I wrote the BMR formula for women and calculated it, then wrote the BMR formula for men and calculated it ***(KS2)****.*
PT.09 : Are you sure your chosen strategy can solve the problem?

ST.09 : Sure, because I also chose the right formula ***(KS2)****.*
PT.10 : Have you solved the problem with an orderly procedure?
ST.10 : Yes, I did. After I calculated it, I concluded that the calorie needs are different because the BMR results are different ***(KS3)****.*

Referring to the interview above, ST could identify what is known and asked even though he did not write it in the answer sheet. This means ST could identify the problem (KS1). ST solved the problem by writing down the formula of male BMR and then female BMR and calculating it; he believed that the strategy chosen could solve the problem (KS2). ST also solved the problem with a sequential procedure according to the plan until the conclusion was reached (KS3).

Ability to Use Symbolic, Formal, and Technical Language and Operations

The following are excerpts of interviews with ST on indicators of the ability to use symbolic, formal, and technical language and operations.

PT.07 : Is there a math calculation to solve this problem?
ST.07 : Available.
PT.08 : What arithmetic operations did you use?
ST.08 : Addition, multiplication, and subtraction ***(KB1)****.*

Referring to the interview excerpt above, ST used math calculations to solve the problem; the math operations used were addition, multiplication, and subtraction. From the written answer, ST can also use math operations correctly to solve the problem (KB1).

Ability to Use Math Tools

The following are excerpts of interviews with ST on indicators of the ability to use mathematical tools.

PT.07 : Is a math tool like a ruler needed to solve this problem?
ST.07 : No, because it only requires calculations and comparing the results. There is no need to make a number line, so I don't use a ruler ***(KA1)****.*

Referring to the interview excerpts above, ST could explain why he did not need math tools to solve this problem. This means that ST knew when appropriate and when not to use math tools. To solve this problem, ST did not use math tools because ST only needed calculations and already understood the position of a number, so when comparing, he immediately understood.

Medium Mathematical Ability

Communication Ability

Based on Figure 2, he wrote the process of reaching the solution quite coherently, but he made calculation errors in the female BMR section in the third and fourth lines. Although SS had written the work coherently, he could not reach the solution correctly (KK1). Then, SS wrote the conclusion that they need different amounts of calories (KK2).

Mathematization Ability

The following are excerpts of interviews with SS on indicators of mathematization ability.

PS.07 : Tell me how you converted this problem into a mathematical model.
SS.07 : I used equations because the problem did not have numbers ***(KM1)****.*
PS.08 : What to visualize?

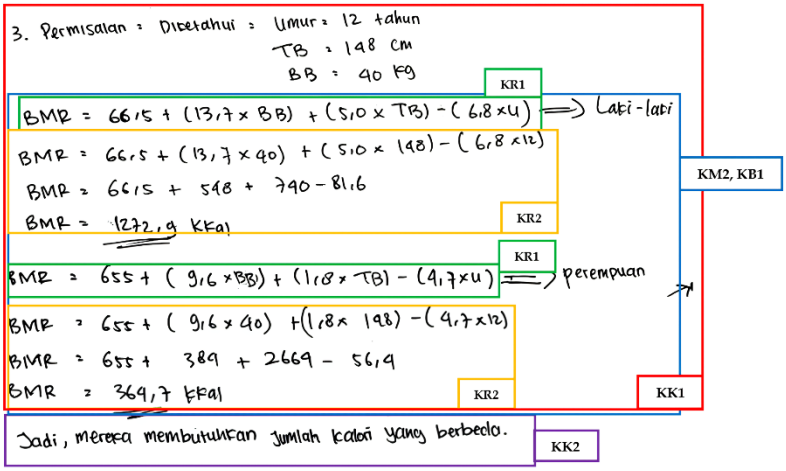

Figure 2. SS Work Result

SS.08 : She is 12 years old, her height is 148 cm, her weight is 40 kg. After that, I entered it into the BMR formula for men and women ***(KM1)****.*

Referring to the interview above, SS transformed the problem into a mathematical model (KM1) by working on it using equations. He modelled his age as 12 years old, height as 148 cm, and weight as 40 kg for males and females, both males and females. Judging from Figure 2, SS solved it using the understanding of the context that he had explained earlier (KM2).

Representation Ability

Based on SS's work in Figure 2 above, SS could change the mathematical equation and present it in writing (KR1). He used the equation to determine the BMR of men and women. The equation SS used to reach the solution was correct, but SS made a calculation error. The BMR of a female aged 12, height 148 cm, and weight 40 kg should be 1,249 kcal. This indicates that SS had not been able to solve the problem entirely using the equation presented (KR2).

Reasoning and Argument Ability

The following are excerpts of interviews with SS on the reasoning and argument ability indicators.

PS.07 : How did you think about doing this problem?
SS.07 : Use an approximation because there are no numbers here ***(KP1)****.*
PS.08 : What is the model you made for male and female?
SS.08 : Yes ***(KP1)****.*
PS.09 : Why?
SS.09 : Because these are twins, the age is the same, and the height and weight are the same ***(KP2)****.*
PS.10 : These different results were obtained after applying?
SS.10 : After the permutation is entered into the BMR formula ***(KP2)****.*
PS.11 : So what is your conclusion?
SS.11 : Men and women need different calories even though they are twins ***(KP3)****.*
PS.12 : Why is that?
SS.12 : Because the BMR results are different ***(KP3)****.*
PS.13 : To calculate calorie needs, it's not enough to calculate BMR alone; why do you have to calculate. From the BMR results alone, can BMR conclude that they are different calories?
SS.13 : (silence) ***(KP4)***

Referring to the interview excerpt above, SS worked by making a simile (KP1) because, in the problem, there was no value that could be calculated into the equation. Permissiveness made by SS is used for men and women. SS used the simile (KP2) for boys and girls because the problem explained that the two children are twins, so they are the same age, the same weight, and the same height.

For KP3 indicators, namely being able to infer from a statement and explain logically. SS concluded that the boy and girl need different calories even though they are twins and have the same weight and height. The reason was that their BMR values were different. However, when asked why SS could conclude that their calorie needs were different just by looking at BMR alone, he was silent and could not argue (KP4).

Ability to Choose Strategies to Solve Problems

The following are excerpts of interviews with SS on indicators of the ability to choose strategies to solve problems.

PS.07 : What is asked in this question?
SS.07 : Provides an argument for the statement that if two twins of the same height and weight need the same, the same calories ***(KS1)****.*
PS.08 : What is your strategy for working on this problem?
SS.08 : To give an example, let's say I'm 12 years old, 148 cm tall, and 40 kg ***(KS2)****.*
PS.09 : Are you sure that by using modelling, you will get the answer?
SS.09 : Sure, because there are no numbers here ***(KS2)****.*
PS.10 : It's like that, it's done?
SS.10 : No, after generalizing, I entered each BMR formula. If the results are different, it means the calories are different ***(KS3)****.*

Based on SS's work in Figure 2 above, SS wrote the known from the equation he had made, namely age 12 years, height 148 cm, and weight 40 kg. Referring to the interview excerpt, SS could also explain what is asked in the problem (KS1). The strategy that SS used to work on this problem was using the equation; he was confident that the strategy used would solve the problem (KS2). SS planned the solution by calculating it using the BMR formula. If the results were different later, it means the calories needed were different. SS could plan the solution appropriately (KS3).

Ability to Use Symbolic, Formal, and Technical Language and Operations

The following are excerpts of interviews with SS on indicators of the ability to use symbolic, formal, and technical language and operations.

PS.07 : What arithmetic operations are used in this problem?
SS.07 : There is addition, multiplication, and subtraction ***(KB1)****.*

Referring to the interview excerpt above, SS could mention what calculation operations he used to solve the problem. SS was also confident in his calculation results, even though his results were incorrect. SS answered and wrote on the answer sheet that the result of 1.8 x 148 is 2664, whereas the result should be 266.4.

Ability to Use Math Tools

The following are excerpts of interviews with SS on indicators of the ability to use mathematical tools.

PS.07 : Do you need a ruler math tool for this problem?

*SS.07 : No **(KA1)**.*
PS.08 : Why?
*SS.08 : I calculate **(KA1)**.*

Based on the interview excerpt, SS did not need a ruler math tool; he only completed the calculation. This was because SS already understands the position of a number. SS could determine when to use and not when to use math tools.

Low Mathematical Ability

Students with low mathematics ability could not solve the numeracy test questions, so the researcher only got some information through interviews. The following are the results of the analysis.

Communication Ability

The following are excerpts of interviews with SR on communication ability indicators.

PR.01 : How come you can't do this problem??
SR.01 : (silence).
PR.02 : Or do you need clarification about what the question means?
*SR.02 : Yes, I am confused because of **(KK1)**.*

Referring to the interview excerpt above, SR did not work on numeracy test question number 3 because she had difficulty (KK1). When asked about the difficulty in which part, SR was silent and did not answer. After being asked again, it turned out that SR was still confused or did not understand the question, so she could not solve it. SR could also not conclude the mathematical results because she had not worked on them (KK2).

Mathematization Ability

The following are excerpts of interviews with SR on indicators of mathematization ability.

PR.01 : What do you think this question is about after reading it?
*SR.01 : About health, about calories **(KM1)**.*
PR.02 : Will it require math calculations or just words?
*SR.02 : Need **(KM1)**.*
PR.03 : How to convert the problem to a mathematical model like what?
SR.03 : (silence).
PR.04 : Why do you use calculations? There are no numbers here; what is being calculated?
SR.04 : (silence).

According to SR, the problem was health and calories. SR could not explain how to convert the problem into a mathematical model (KM1). She argued that the process requires mathematical calculations. However, when asked why she used math calculations and which parts were calculated, SR could not answer. This is shown in the interview excerpt. SR did not solve the problem by using context understanding (KM2) because previously, she did not understand the meaning of the question.

Representation Ability

The following is an excerpt from an interview with SR on the representation ability indicator.

PR.01 : According to you, do you use a formula or not?
*SR.01 : No **(KR1)**.*
PR.02 : If so, it requires math calculations. How do you do it?

SR.02 : I don't know ***(KR2)****.*

According to SR, solving numeracy test question number 3 does not require a formula. In fact, it should require an equation from BMR to compare the calorie needs of men and women. Because SR could not solve the problem at all (KR2), he also did not use or change the information presented (KR1), as shown in the interview excerpt above.

Reasoning and Argument Ability

SR did not make patterns and relationships to solve the problem (KP1); he also could not provide reasons for the patterns and relationships because he could not work at all (KP2). SR did not provide reasons for the conclusion (KP4) because she could not conclude the result (KP3).

Ability to Choose Strategies to Solve Problems

SR did not create a strategy (KS2) or solution plan (KS3). He needed help understanding the question, so he could not mention the known and asked information (KS1).

Ability to Use Symbolic, Formal, and Technical Language and Operations

SR did not try to solve the problem with calculations, so no symbols or counting operations were used (KB1).

Ability to Use Math Tools

The following are excerpts of interviews with SS on indicators of the ability to use mathematical tools.

PR.01 : Do you think working on this problem requires math tools like a ruler or not?
SR.01 : No ***(KA1)****.*

SR did not complete the numeracy test questions, so she could not know whether she used mathematical tools to solve the problem (KA1). However, during the interview, she argued that she did not need math tools to solve the problem. SR could not explain why she did not need math tools to solve the problem. SR was confused when asked to give a possible argument because she did not understand the question's meaning.

Discussion

Based on the analysis results, Table 3 shows the differences between the three subjects in solving AKM questions on number content.

Table 3. Student Numeracy Comparison

Indicator	Sub-indicator	Math Ability Categories		
		High	**Medium**	**Low**
KK	KK1	The subject wrote down the process to solve by including the BMR calculation.	The subject wrote the process of reaching the solution quite coherently but made a calculation error in female BMR when multiplying a decimal with a whole number.	The subject could not solve problem number 3 because she was still confused and did not understand the question, so she could not communicate the process to reach the solution.
	KK2	The subject disagreed with the statement because after she had calculated it, the BMR	The subject wrote down the conclusion on whether the two twins need	SR could not make a conclusion on the mathematical result

Indica-tor	Sub-indicator	Math Ability Categories		
		High	**Medium**	**Low**
		values of men and women were different. Students with high math ability also wrote the conclusion on the answer sheet if they needed different calories.	different amounts of calories.	because he had not worked on it.
KM	KM1	The subject converted contextual problems to mathematical models by reading and understanding the problem first. Students with high mathematical ability use the BMR equation because they see the relationship with the statement about calorie needs.	The subject converted the problem to a mathematical model by reading it and then using permutations for height, weight, and age because there are no numbers in the problem.	Students with low mathematical ability needed help explaining how to convert the problem into a mathematical model.
	KM2	When solving the male and female BMR equations, the subject's calculations were correct.	The subject solved this by using the understanding of the context that had been understood, and after generalizing, he calculated it using the BMR equation.	Students with low mathematical ability did not solve the problem using context understanding because, previously, they needed to understand the question's meaning.
KR	KR1	The subject wrote down the equation used to solve the problem, namely the BMR of men and women, where the equation information has been presented in the reading.	The subject changed the equation for male and female BMR presented in the reading.	The subject said that question 3 of this numeracy test does not require an equation, and solving it requires the BMR equation.
	KR2	The subject solved using the equation written earlier.	The subject solved the problem by using the male and female BMR equations. However, in the solution, the subject made a calculation error.	He needed help to solve the problem.
KP3	KP1	The subject solved the problem by generalizing age, height, and weight first.	The patterns and relationships the subject used to solve the problem are determined by generalizing height, weight, and age because no known numbers were involved.	He did not make patterns and relationships to solve the problem because he did not solve the problem at all.
	KP2	The subject said age, height, and weight are free as long as both boys and girls are given the same values. Because the	The subject used the same numbers because the question mentioned the children being twins, meaning they are the	The subject could not explain the patterns and relationships because the subject had not made

Indicator	Sub-indicator	Math Ability Categories		
		High	**Medium**	**Low**
		value of the problem is unknown, an assumption is necessary to solve this problem.	same age, height, and weight.	them before. The subject also did not try to solve the problem.
	KP3	The subject concluded that the calories needed are different, and she disagreed with the statement in the question.	The subject concluded that men and women need different calories even though they are twins because the results differ after calculating their BMR.	The subject could not draw the mathematical result because he had not completed or done any calculations.
	KP4	The subject gave an argument disagreeing with the statement because, after calculation, the BMR of boys and girls is different, so their calorie needs must also be different. So, not all ages, heights, and weights are the same, so a person's calorie needs are the same.	The subject was silent during the interview and asked why he could conclude that the calories needed were different when he could only calculate BMR.	The subject did not give reasons for the conclusion because he did not conclude the final result.
KS	KS1	The subject mentioned what information is known and asked correctly orally. During the interview, the subject mentioned that in the question, it is known that there are two twin boys and girls who have the same weight and height, so their caloric needs will also be the same. The subject was asked to provide an argument on whether she agreed or disagreed with the statement.	The subject wrote down the equation made and mentioned what the question asked during the interview. The equation written down was 12 years old, 148 cm tall, and 40 kg in weight. In the question, the subject was asked to give an opinion on whether he agreed with the statement presented.	The subject did not understand what the question meant, so He did not identify the known and asked information.
	KS2	The strategy the subject used to solve the problem was to write down the BMR equation for men and women and then calculate it using the equation.	The subject used age, height, and weight to solve the problem and then calculated the BMR.	The subject did not determine the strategy for solving the problem because the subject did not try to solve the problem.
	KS3	The subject planned the solution by first calculating the BMR and then concluding from the results of the calculations.	The subject planned the solution by calculating using the male and female BMR equations.	No solution plan was made by the subject because the instructions for the problem needed to be understood.

Indicator	Sub-indicator	Math Ability Categories		
		High	**Medium**	**Low**
KB	KB1	The subject performed math calculations correctly; the calculation operations used are addition, multiplication, and subtraction.	The subject used addition, multiplication, and subtraction operations to perform calculations. Students with moderate math ability make calculation errors when multiplying decimal numbers with whole numbers.	The subject did not try to solve with calculations, so no symbols or counting operations were used.
KA	KA1	The subject did not use a ruler math tool and only used calculations. Students with high mathematical ability already understand the position of numbers, so there was no need to compare using a number line.	The subject said it does not require math tools to solve as it only requires calculations.	The subject did not complete the numeracy test questions, so the researcher must determine whether he used mathematical tools to solve the problems.

Based on the numeracy comparison table above, students with high and medium mathematical abilities were able to communicate the process of reaching the solution and draw conclusions about mathematical results. However, when determining the solution, students with moderate mathematical ability make calculation errors. These results align with research conducted by Rezky et al. (2022), which states that students with high and medium mathematical abilities communicate solutions quite well. However, there are still calculation errors for students with medium mathematical abilities. However, both students were able to write the answer correctly. Students with low mathematical ability could not solve this problem because of difficulties.

Students with high and medium mathematical abilities change contextual problems to mathematical models by reading and understanding the problems and information presented. Students with high mathematical ability can convert given problems into mathematical form and solve them (Sulastri et al., 2017). Students with moderate mathematical ability can analyze the information presented in the problem to solve the problem (Sari & Aini, 2022). Students with low mathematical ability were not able to convert contextual problems into mathematical models. The results of this study are relevant to previous research conducted by Sulastri et al. (2017), which states that students with low mathematical ability have difficulty understanding the problems given in mathematical form.

In general, students with high and medium mathematical abilities could change the equations, pictures, diagrams/tables presented. Both students solved the problem by using the previously determined equation and the information presented in both the table and the picture. Research conducted by Sari and Aini (2022) showed similar results that students with high mathematical ability could represent information displayed in various forms.

Research conducted by Anggrieni and Putri (2018) shows that students with moderate mathematical ability can make mathematical representations of information altogether. Students with low mathematical ability are not able to change the equations, tables, and images presented to solve problems because they need to use the information appropriately; students need to know what information they get from the problem or problem stimulus. The results of this study are relevant to previous research, which shows that students with low mathematical ability have difficulty representing problems (Sulastri et al., 2017).

On the indicators of reasoning ability and argument, students with high and medium mathematical abilities can determine, give reasons, conclude, and provide arguments from patterns and relationships to solve problems. Research conducted by Anggraini and Setianingsih (2022) showed similar results that determining solutions by applying related mathematical concepts and solving problems accompanied by appropriate reasons could be achieved by students with high mathematical ability. The same results as previous research show that students with moderate mathematical ability can use precise and correct mathematical reasoning, and they can provide conclusions accompanied by the right reasons through a series of works (Rezky et al., 2022). Students with low ability cannot use reasoning and argument skills because they cannot determine patterns and relationships and provide arguments. The results of this study are relevant to research conducted by Nuringtyas & Setyaningsih (2023), which shows that students with low mathematics ability still need to fulfill the indicators of reasoning. This condition is also in line with the research of Istikhoirini and Fitri (2022), which shows that students with low mathematics ability are less capable of mathematical reasoning.

Students with high and medium mathematics abilities can identify problems, determine strategies to solve problems, and plan solutions appropriately. In line with research conducted by Anggraini and Setianingsih (2022), students with high and medium abilities can take information from the stimulus given and determine the procedure to solve the problem appropriately. Students with low mathematical ability are unable to determine strategies and planning. These results are relevant to research conducted by Sari and Aini (2022) which showed that students who have a low ability to solve problems are less able to choose and implement a solution strategy.

In the indicator of the ability to use symbolic, formal, and technical language and operations, students with high mathematical ability can use mathematical symbols by performing calculations with formal symbols. This research was based on Sari and Aini (2022), who also obtained results that show that students with high mathematical abilities can use symbolic/numeric language in solving problems. Students with moderate ability could not use symbolic language and operations because they made calculation errors. The same research results were shown by Rezky et al. (2022), which stated that students with moderate mathematical ability could solve but make calculation errors. Students with low ability cannot solve problems, so the indicators of their ability to use symbolic, formal, and technical language and operations cannot be fulfilled.

For the indicator of the ability to use mathematical tools, students with high mathematical ability can determine when to use mathematical tools and when not to use mathematical tools to solve problems. To solve all these problems, students did not use math tools because they only needed calculations and already understood the position of a number. Students with moderate mathematical ability also did the same thing; the difference was that the student needed help to make a number line to sort and compare. Students with low mathematical ability could not explain why they did not need mathematical tools to solve the problem.

CONCLUSION AND SUGGESTIONS

Only students with high mathematical ability can fulfill all numeracy indicators. These indicators are communication skills, mathematization skills, representation skills, reasoning and argument skills, ability to choose strategies to solve problems, ability to use symbolic, formal, and technical language and operations, and ability to use mathematical tools.

Students with moderate mathematics ability can only fulfill 6 out of 7 numeracy indicators. The indicators that still needed to be met were the indicators of the ability to use symbolic, formal, and technical language and operations because he made mistakes in the calculation process. Of the six indicators used, more than 1-2 sub-indicators can be fulfilled. Meanwhile, students with low mathematical ability could only fulfil some numeracy indicators to solve the problem.

This study's suggestions for teachers are to familiarize students with working on problems in the context of everyday life, especially AKM problems. Based on the results of the study, some students are not used to working on AKM problems, and some have never encountered similar problems. The results of this study can be used as a reference for further research so that when choosing a subject, a more representative one is chosen for the medium category.

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