Analysis of Mathematical Literacy Ability in Terms of Keirsey's Personality Types

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Abstract

Learning mathematics extends beyond mastering formulas and techniques; it involves critical thinking and problem-solving skills that are applicable to everyday life. Therefore, a key ability that supports this is mathematical literacy. This study aims to describe students' mathematical literacy skills in relation to Keirsey's personality types. The research is qualitative in nature and adopts a descriptive approach. It was conducted at a highly accredited public junior high school located in Sekarsuli, Klaten Utara, Central Java. The study focused on seventh-grade students selected through purposive sampling. The results indicate that: (1) Students with a Guardian personality type meet all indicators of mathematical literacy, demonstrating the ability to create mathematical models using symbols, apply reasoning with equations, design strategies, and interpret results in real-world contexts. (2) Students with an Artisan personality type have not fully met all indicators of mathematical literacy, particularly in providing correct interpretations or arguments related to their conclusions. (3) Students with Rational and Idealist personality types also struggle to meet all indicators of mathematical literacy, especially in applying mathematical concepts to everyday life and providing appropriate arguments for their answers.

Keywords: *Mathematical Literacy Ability; Keirsey's Personality Type*

Introduction

Mathematics is an essential component of the educational curriculum that must be studied by students from the basic education level to higher education (Astuti & Wijaya, 2020). The goal of learning mathematics is not just to master calculations or formulas for solving problems (Nurani et al., 2020). In line with this, the National Council of Teachers of Mathematics (NCTM) in 2000 formulated that mathematics education should include problem-solving, reasoning and proof, connections, communication, and representation skills (NCTM, 2000). This means that mathematics education should not only focus on mastering formulas and techniques, but also involve critical thinking and problem-solving skills relevant to everyday life. This requires an ability called mathematical literacy.

Mathematical literacy is the ability to formulate, use, and interpret mathematical concepts to solve everyday problems. According to (Ojose, 2011), mathematical literacy includes understanding and applying fundamental mathematical concepts in everyday contexts. Students are considered to have good

mathematical literacy when they can recognize and understand mathematical concepts relevant to the problems they encounter in daily life. With this understanding, students can relate mathematical concepts to real-world situations and use that knowledge to formulate appropriate problem-solving strategies. By understanding relevant mathematical concepts, students can translate problems into appropriate mathematical forms. The process of mathematical literacy involves a series of complex mathematical thinking activities, including exploring, connecting, formulating, determining, reasoning, and other mathematical thought processes. In this context, (Hera & Sari, 2015) define mathematical literacy as the ability to formulate, use, and interpret mathematics in various contexts to effectively solve everyday problems.

Mathematical literacy is one of the higher-order skills. This aligns with the main focus of PISA (Programme for International Student Assessment), which includes reading literacy, scientific literacy, and mathematical literacy. In the demands of the modern era, students are required to have high mathematical literacy skills to compete globally (Masfufah & Afriansyah, 2021). However, the PISA 2018 results show that Indonesia ranked 72nd out of 77 countries with an average score of 386, below the international average of 490. This indicates that students' academic abilities in Indonesia, particularly in mathematics, are still low (OECD, 2019a). Factors affecting mathematical literacy can be categorized into three main groups: personal, instructional, and environmental factors (Masjaya & Wardono, 2018). These factors significantly influence the extent to which students can develop their mathematical literacy. In addition to these factors, personality type also plays a role in influencing students' mathematical literacy.

A person's personality can be understood through their thought processes, which are influenced by individual characteristics. Human personalities are diverse, and experts have classified them into certain types to better understand human character, as done by Keirsey. Keirsey's personality theory classifies personality types based on observable behavior patterns, but it focuses more on how a person thinks. Keirsey divides personalities into four types: Guardian, Artisan, Rational, and Idealist, based on temperament. The Temperament Sorter is a widely used tool to determine personality through a series of powerful questions that help identify an individual's type (Keirsey, 1998). The Guardian personality type prefers routine procedures with detailed instructions, or in other words, this type favors traditional classroom models with regular procedures. The Artisan personality type enjoys classes with discussions and presentations because they like to showcase their abilities, and they prefer change over stability. The Rational personality type prefers learning through complex problem-solving, enjoys independent learning, and can grasp abstract concepts and intellectually demanding material. The Idealist personality type prefers completing tasks through group discussions, enjoys reading and writing, and is more suited to tests in the form of essays or narrative questions (Keirsey, 1998).

Relevant research (Sirri et al., 2020) suggests that students with Guardian, Artisan, Rational, and Idealist personality types achieve different learning outcomes, indicating that personality type can influence student learning outcomes. Furthermore, (Nismaya, 2018) found differences in student performance in solving mathematical problems based on personality type. (a) Students with Artisan, Rational, and Idealist personality types show active participation during the learning process in solving mathematical problems. (b) Students with Artisan, Guardian, and Rational personality types tend to collaborate and cooperate during learning to solve math problems. (c) Students with Artisan and Guardian personality types demonstrate high levels of tolerance during the learning process in solving mathematical problems.

Based on expert opinions and the issues discussed, the purpose of this study is to describe mathematical literacy skills from the perspective of students' personality types. The results of this study are expected to provide valuable insights for teachers in developing students' mathematical literacy skills.

Method

This research is a qualitative descriptive study conducted at a highly accredited public junior high school located in Sekarsuli, Klaten Utara, Central Java. The subjects of this study were 30 seventh-grade students. The research was carried out in March 2023. To collect data, the subjects were given mathematical literacy test questions related to geometric shapes, Keirsey personality type questionnaires, and participated in interviews. After the students completed the mathematical literacy test and filled out the Keirsey personality type questionnaire, 4 students were selected, each representing one personality type, using purposive sampling techniques (Sugiyono, 2017). The selection of subjects was based on the teacher's considerations, as the teacher is familiar with the characteristics of their students. To enhance the credibility of the data, this study employed the triangulation method. The triangulation in this study involved comparing the results of the mathematical literacy tests with the interview findings. This approach ensures that the data obtained are valid and can be used in the analysis (Praja, Fajrul Najmuddin Abdi Fuady & Sari, 2021). The research stages followed the Miles and Huberman model (Rijali, 2019), which includes data collection, data reduction, data presentation, and drawing conclusions.

Data Collection

Data collection is the first step taken before analyzing the data. The research was conducted directly by the researchers in two stages. The first stage involved administering a mathematical literacy test consisting of 3 descriptive questions related to geometric shapes to all students. The second stage involved distributing a Keirsey personality type questionnaire containing 60 statements. The steps taken by the researchers to collect data are as follows: (1) conducting tests to measure students' mathematical literacy and personality type; (2) grouping students according to Keirsey's personality type; (3) selecting 4 students, one from each personality type, based on the results of the mathematical literacy test, with the selection made based on the teacher's considerations; (4) conducting interviews with each selected subject.

Data Reduction

Data reduction is the process of simplifying the collected data by selecting important information and classifying it into broader patterns (Rijali, 2019). In this study, data reduction was performed by identifying and retaining the key data necessary for the research. The researchers repeatedly reviewed the data to ensure that it aligned with the study's objectives. The reduced data includes all relevant information related to mathematical literacy.

Data Presentation

Data presentation is the activity carried out after important information has been compiled, enabling conclusions to be drawn and actions to be taken (Rijali, 2019). The data is presented concisely and clearly. The data obtained includes the results of the mathematical literacy test for each student with Guardian, Artisan, Rational, and Idealist personality types, which are then analyzed and presented in the form of a narrative. The mathematical literacy indicators used in this study, adopted from the OECD (OECD, 2019b), are shown in Table 1.

Table 1. Aspects and Indicators of Mathematical Literacy

No	Aspects	Indicator
1	Formulate mathematical problems	Formulate situations in mathematical forms or models using appropriate representations
2	Apply or use mathematical knowledge	Using mathematical concepts, facts, and procedures to solve everyday problems
3	Interpreting Mathematical Solutions	Giving interpretation using reason or argumentation

Results and Discussion

Results

The results of the mathematical literacy ability test consisting of 3 description questions from all students, are presented in Table 2.

Table 2. Mathematical Literacy Ability Test Results

Size	Result
Max	100
Min	46,67
Average	72
Standard Deviation	1,55

Based on the results of mathematical literacy ability tests from 30 students. There were 14 students or 46.67% scored above average. Overall, the results of the mathematical literacy ability test provide an idea of the variation in the level of students' ability to understand and apply mathematical concepts. These values can be used to identify students who need additional guidance or special attention in their math literacy development. The results of the personality type questionnaire consisting of 60 statement items are presented in Table 3.

Table 3. Keirsey's Personality Type Distribution

Personality Type	Multiple Students	Presented
Guardian	21	70 %
Artisan	7	23,33 %
Rational	1	3,33 %
Idealist	1	3,33 %

Based on personality type questionnaire data from 30 students, there are several important information that can be retrieved. Of the total 30 students who were the subjects of the study, the guardian personality type became the majority personality type owned by students. Later, students with rational and idealist personality types became minority personality types.

After students did the mathematical literacy test questions and filled out the personality type questionnaire, the researcher determined 4 students as research subjects for each personality type and then the subjects were interviewed. 4 students were selected as research subjects judging from the scores they obtained which are presented in Table 4.

Table 4. Research Subjects

No	Code	Score	Personality Type
1	S1	100	Guardian
2	S2	96,67	Artisan
3	S3	80	Rational
4	S4	70	Idealist

Exposure to S1 Mathematical Literacy Data with Guardian Personality Type

Figure 1. Results of the Mathematical Literacy Ability Test Number 1 in S1

Based on Figure 1, it can be seen that S1 writes down information about "what is known" and "what is asked" clearly and correctly. S1 symbolizes the length of the lunch box with a "P", the width of the lunch box with the "L" and the height of the lunch box with the "t". S1 is able to formulate situations in mathematical forms or models using appropriate representations, S1 also interprets the meaning of the statements on the problem correctly. The calculation results made by S1 are also correct, then S1 interprets the results of the solution according to the test questions by returning to the real-life context. When conducted an interview, S1 stated the reason for using the formula used.

> *S1: What is asked in the problem is the area of a box right ma'am, then the box is in the shape of a block, so I can easily use the beam surface area formula to solve the problem.*

Based on the interview excerpt above, the researcher concluded that S1 had met all indicators of mathematical literacy ability. The calculation results carried out by S1 are also correct, then S1 interprets the completion results according to the test questions. In the next question, question number 2, S1 is also able to mention what is known and what is asked in question number 2 as shown in Figure 2.

Figure 2. Results of Mathematical Literacy Ability Test Number 2 in S1

The S1 subject also gave the same reason when interviewed regarding how to do question number 2.

> *S1: I can easily do question number 2 because the type of question is almost the same as question number 1 because I think the gift is also in the form of blocks, it's just that question number two asked is the volume.*

Based on the interview excerpt above, the researcher concluded that S1 has fulfilled all indicators of mathematical literacy ability, namely students are able to formulate situations in mathematical forms or models using appropriate representations, students are able to use mathematical concepts and procedures to solve problems and students are also able to interpret the results of solving according to the test questions. In question number 3, S1 completes all indicators supported by the interview results, as shown in Figure 3.

Figure 3. Results of Mathematical Literacy Ability Test Number 3 on S1

S1 subjects can understand, and explain mathematical structures in the form of problem context relationships with previous problems mathematically and precisely. In addition, S1 has implemented a strategy by extracting mathematical information. Subject S1 clearly explains the meaning of the statement in the question regarding the surface area of capless tupperware . The calculation results made by S1 are also correct, then S1 interprets the results of solving test questions by returning real-life contexts.

Exposure to S2 Mathematical Literacy Data with Artisan Personality Types

Figure 4. Results of the number 1 mathematical literacy ability test in S2

Based on Figure 4, subject S2 gives the right answer. However, in the process of reinterpreting the answer, subject S2 was not quite right because he should have written "lunch box" but he wrote "eating block". Errors in reinterpreting answers are clarified when S2 subjects are interviewed.

Researcher : What information did you get from question number 1?

S2   : The length of the lunch box, the width of the lunch box and the height of the lunch box mom.

 Continue to be asked to search the area The surface of the lunch box is mom.

Researcher : Then how did you do the problem?

S2   : First I write down what is known in the problem to facilitate calculations,

    After that because the lunch box is block-shaped, I think using the broad formula

    The surface of the beam is just right. Is there something wrong in my answer mom?

Researcher : Okay, so what is asked in the question is the area of the lunch box, huh?

S2   : True mother.

Researcher : But why when reinterpreting an answer, do you read from your written answer is the area of the dining beam should be the correct area of the lunch box, right?

S2 : Because the lunch box is in the shape of a mother block, so I call it a dining block   instead of a box eat, because my calculations use the formula of the surface area of the beam.

From the interviews, researchers concluded that S2 subjects were not right when reinterpreting or giving arguments related to the solutions he used. It can be said that S2 does not meet the third indicator of mathematical literacy ability. In question number 2 the subject S2 has also done the question correctly, S2 writes down what is known and what is asked in the question, as seen in Figure 5.

Figure 5. Results of Mathematical Literacy Ability Test Number 2 in S2

In question number 3, the S2 subject has also completed all indicators of mathematical literacy ability. The subject S2 writes what is known and what is asked from the problem, but here there is a writing error in what is known, where what should be written "side length" S2 instead writes "content length". Then subject S2 wrote down the surface area formula of the capless tupperware taken from the surface area formula of the cube. As seen in Figure 6.

Figure 6. Results of Mathematical Literacy Ability Test Number 3 in S2

The S2 subject also gave the same reason when interviewed regarding how to do question number 3.

Researcher : What formula did you use to solve problem number 3? Why choose formulas aforementioned?

S2 : I use the surface area formula of the cube bu, because in the known problem only one

Only the side is known, then because what is asked in the question is tupperware without a lid, so the side of the cube that should have six I subtract one.

Based on the answers and snippets of interviews with S2 subjects, researchers concluded that all three indicators of mathematical literacy ability had been met by S2. In the first indicator, namely formulating the existing reality mathematically, in the second indicator S2 can compile and apply mathematical strategies using the cube surface area formula. Then when interviewed, S2 explained in detail the use of the formula used.

Exposure to S3 Mathematical Literacy Data with Rational Personality Type

Figure 7. Results of the number 1 mathematical literacy ability test in S3

Based on Figure 7, it appears that S3 has also written down information about "what is known" and "what is asked" clearly and correctly. Then S3 also symbolizes the length of the lunch box with "P", the width of the lunch box with "L" and the height of the lunch box with "t". S3 is also able to interpret the meaning of the statements on the question correctly. The results of the calculations made by S3 are also correct. When conducted the interview, S3 stated the reason for using the formula used.

S3 : I suppose the length of the lunch box with symbol P, the width of the lunch box with symbol L and the height of the lunch box with symbol t to make it shorter. Then because the box is in the form of a block, I chose to use the area formula of the surface of the block.

Based on the interview excerpt above, the researcher concluded that S3 has fulfilled all indicators of mathematical literacy ability, namely students are able to formulate situations in mathematical forms or models using appropriate representations, students are able to use mathematical concepts and procedures to solve problems, then students are able to give interpretations using reason or argumentation. The calculation results carried out by S3 are also correct, then S3 interprets the completion results according to the test questions. In the next question, question number 2, S3 is also able to mention what is known and what is asked in question number 2 as shown in Figure 8.

Figure 8. Results of Mathematical Literacy Ability Test Number 2 in S3

The S3 subject also gave the same reason when interviewed regarding how to do question number 2.

S3 : I think question number two is no different from question number 1, because the Ripia gift is in the form of a block so to find the volume of the Ripia gift I use the formula of the block volume.

Based on the interview excerpt above, the researcher concluded that S3 had met the second indicator and the third indicator of mathematical literacy ability, namely students were able to use mathematical concepts and procedures to solve problems and students were also able to interpret the results of solving according to the test questions. In question number 3, S3 does not understand the context of the problem given, as shown in Figure 9.

Figure 9. Results of Mathematical Literacy Ability Test Number 3 in S3

Based on Figure 9, it can be seen that S3 has also written information about "what is known" and "what is asked" but in what is known S3 only mentions "sides" not "side length" then in the queried part S3 only writes surface area without a lid, without writing what is requested. Then S3 has not been precise in formulating situations in mathematical forms or models using appropriate representations. The S3 subject also gave the same reason when interviewed regarding how to do question number 3.

Researcher : What formula did you use to solve problem number 3? Why choose formulas aforementioned?

S3 : I use the cube surface area formula, because the tupperware is cube-shaped.

Researcher   : What questions are asked in the question?

S3   : Tupperware surface area without cap bu.

Researcher : What should be the correct formula?

S3 : I don't know ma'am, because all I know is the surface area formula of the cube.

Based on the interview excerpt above, the researcher concluded that S3 does not meet the second and third indicators of mathematical literacy ability, because students have not been able to use mathematical concepts, facts, and procedures to solve everyday problems, then students have not been able to give interpretation using reason or argumentation. So that the calculation results made by S3 are not correct.

Exposure to S4 Mathematical Literacy Data with Idealist Personality Type

Figure 10. Results of the number 1 mathematical literacy ability test in S4

Based on Figure 10, it appears that the S4 has also written down information about "what is known" and "what is asked" clearly and correctly. Then S4 in detail writes down what is known in the problem. In addition, S4 symbolizes the length of the lunch box with "P", the width of the lunch box with "L" and the height of the lunch box with "t". S4 is also able to interpret the meaning of the statements on the question correctly. The results of the calculations carried out by S4 are also correct. When interviewed, S4 stated the reason for using the formula used.

Researcher : What do you know about question number 1?

S4　: Inara has a feeding box with a length of 12 cm, 6cm wide and 20 cm tall.

Researcher　: What questions are asked in the question?

S4　: The area of the mother's inara lunch box.

Researcher　: Then, how do you answer that question?

S4　: I did it using the surface area formula of the mother beam, because judging from what is known in the problem, the characteristics show that the lunch box is block-shaped.

Based on the interview excerpt above, the researcher concluded that S4 has met indicators one and two of mathematical literacy ability, namely students are able to use mathematical concepts and procedures to solve problems. The results of the calculations carried out by S4 are also correct. But when interpreting the results of mathematical solutions, S4 does not write the area correctly. So the researchers concluded that S4 did not meet the third indicator of mathematical literacy. Similarly, in question number 2, as seen in Figure 11.

Figure 11. Results of the number 1 mathematical literacy ability test in S4

Based on Figure 11, it appears that the S4 has also written down information about "what is known" and "what is asked" clearly and correctly. Then S4 in detail writes down what is known in the problem. In addition, S4 symbolizes the length of the lunch box with "P", the width of the lunch box with "L" and the height of the lunch box with "t". S4 is also able to interpret the meaning of the statements on the question correctly. The results of the calculations carried out by S4 are also correct. When interviewed, S4 stated the reason for using the formula used.

Researcher   : What do you know about question number 1?

S4 : Inara has a feeding box with a length of 12 cm, 6cm wide and 20 cm tall.

Researcher : What questions are asked in the question?

S4 : The area of the mother's inara lunch box.

Researcher : Then, how do you answer that question?

S4   : I did it using the surface area formula of the mother beam, because judging from what is known in the problem, the characteristics show that the lunch box is block-shaped.

Based on the interview excerpt above, the researcher concluded that S4 has met indicators one and two of mathematical literacy ability, namely students are able to use mathematical concepts and procedures to solve problems. The results of the calculations carried out by S4 are also correct. But when interpreting the results of mathematical solutions, S4 does not write the area correctly. So the researchers concluded that S4 did not meet the third indicator of mathematical literacy. Similarly, in question number 2, as seen in Figure 11.

Figure 12. Results of Mathematical Literacy Ability Test Number 3 on S4

Based on Figure 12, it can be seen that S4 has also written information about "what is known" and "what is asked" but in the section what is asked S4 only writes surface area without specifying surface area without writing what surface area is requested. In formulating situations in mathematical forms or models, S4 has been less precise in using appropriate representations. Then S4 does not provide interpretation using reasons or arguments related to the results that have been obtained. The S4 subject also gave reasons when interviewed regarding how to do question number 3.

Researcher   : What do you know about question number 1?

S4   : The shaft has a cube-shaped tupperware with a side length of 25cm bu.

Researcher   : What questions are asked in the question?

S4   : Surface area of tupperware without cap bu.

Researcher : Why, in your answer to question number 3 is only written surface area?

S4   : I think it's because it's obviously questioned so I don't need to rewrite mom.

Researcher : What formula did you use to solve problem number 3? Why choose formulas

 aforementioned?

S4   : Definitely the surface area formula of the cube bu, but because of the tupperware   without a lid it becomes His side is missing one ma'am.

Based on excerpts from the answers to question number 3 and the interview above, researchers concluded that S4 did not meet the second and third indicators of mathematical literacy ability, because students were not suitable in using mathematical concepts, facts, and procedures to solve everyday problems. Then, S4 has not been able to give interpretation using reason or argumentation.

Discussion

Based on the results of research on mathematical literacy skills in terms of Keirsey's personality type, it can be clearly known all discussions of students' mathematical literacy abilities based on Keirsey's personality type as follows.

Profile of Mathematical Literacy Ability with Guardian Personality Type (S1)

Based on the results of the mathematical literacy test and plus the interview session, the results of S1 data analysis showed the fulfillment of all indicators of mathematical literacy ability. In the first literacy indicator, students must be able to formulate situations in mathematical forms or models using appropriate representations. This important part is analyzed to become the basic thing that S1 did at the beginning. The steps taken by S1 are in the form of writing down what is known and what is asked in the question correctly, such as symbolizing the length of the lunch box with "P", the width of the lunch box with "L" and the height of the lunch box with "t".

The second indicator of mathematical literacy is using mathematical concepts, facts, and procedures to solve everyday problems. The subject of S1 is able to determine what formula is appropriate to solve the problem, where S1 has correctly used the appropriate formulas in working on problems related to the surface area of the block, the volume of the cube and the surface area of the cube without the block. The third indicator of mathematical literacy ability is to provide interpretation using reason or argumentation. At this stage, S1 can provide interpretation using its arguments and pour in the context of the problem correctly. Thus, it can be said that S1 has met the last indicator of mathematical literacy ability. S1 is able to formulate situations in mathematical forms or models using appropriate representations, S1 also interprets the meaning of the statements on the problem correctly. The calculation results made by S1 are also correct, then S1 interprets the results of the solution according to the test questions by returning to the real-life context. When conducted an interview, S1 stated the reason for using the formula used.

Based on the description above, it can be said that students with guardian personalities are able to solve mathematical literacy-based problems properly and correctly. All indicators of mathematical literacy ability can be fulfilled completely. This is in line with (Susanti & Maharani, 2016) which states that students with the type of guardian work can carry out well-prepared and correct problem-solving plans.

Profile of Mathematical Literacy Ability with Artisan Personality Type (S2)

Based on the results of the mathematical literacy test and plus the interview session, the results of S2 data analysis were only able to meet two indicators of mathematical literacy ability, namely the first

indicator and the second indicator. In the first literacy indicator, students must be able to formulate situations in mathematical forms or models using appropriate representations. This important part is analyzed to become the basic thing that S2 did at the beginning. The steps taken by S2 are in the form of writing down what is known and what is asked in the question correctly.

The second indicator of mathematical literacy is using mathematical concepts, facts, and procedures to solve everyday problems. The subject of S2 is able to determine what formula is appropriate to solve the problem, where S2 has correctly used the appropriate formulas in working on problems related to the surface area of the block, the volume of the cube and the surface area of the cube without the block. The third indicator of mathematical literacy ability is to provide interpretation using reason or argumentation. At this stage, S2 provides interpretation using its arguments and pouring in the context of the problem but there is a slight error when interpreting the results of question number one. Where S2 should write the surface area of the inara feeding box instead write down the inara feeding block.

Based on the description above, it can be said that students with artisan personalities have not been able to meet all indicators of mathematical literacy ability completely. Where students have not been able to provide interpretation or argumentation related to the conclusion of the answer correctly. This is in line with research conducted by (Monica, 2023) which states that subjects with artisan types can solve mathematical literacy problems, but because the subject is always in a hurry to do everything, the subject derives wrong conclusions on indicators of reasoning and reasoning.

Profile of Mathematical Literacy Ability with Rational Personality Type (S3)

Based on the results of the mathematical literacy test and plus the interview session, the results of S3 data analysis were only able to meet one indicator of mathematical literacy ability, namely the first indicator. In the first literacy indicator, students must be able to formulate situations in mathematical forms or models using appropriate representations. This important part is analyzed to become the basic thing that S3 did at the beginning. The steps taken are in the form of writing down what is known and what is asked in the question correctly.

The second indicator of mathematical literacy is using mathematical concepts, facts, and procedures to solve everyday problems. S3 subjects are still having a hard time. As in problem number three, S3 has not been able to use mathematical concepts, facts, and procedures to solve everyday problems. S3 struggled when determining the formula to lock the surface area of tupperware without a lid. So that the calculation made by S3 is not correct. Then in the third indicator of mathematical literacy ability, namely providing interpretation using reason or argumentation, S3 is not appropriate when providing arguments that are appropriate to the context.

Based on the description above, it can be said that students with rational personalities have not been able to meet all indicators of mathematical literacy ability completely. Where students have not been able to use mathematical concepts in everyday life and students have not been appropriate in providing arguments related to the answers given. This is not in line with research conducted by (Prasasti et al., 2023) which states that mathematical literacy (numeracy) of students with rational personality types is able to achieve indicators up to level 6 and do problems randomly but in interpreting the results in great detail.

Profile of Mathematical Literacy Ability with Idealist Personality Type (S4)

Based on the results of the mathematical literacy test and plus the interview session, the results of S4 data analysis are the same as S3 where S4 is only able to meet one indicator of mathematical literacy ability, namely the first indicator. In the first literacy indicator, students must be able to formulate situations in mathematical forms or models using appropriate representations. This important part is

analyzed to become the basic thing that S4 did at the beginning. The steps taken are in the form of writing down what is known and what is asked in the question correctly.

The second indicator of mathematical literacy is using mathematical concepts, facts, and procedures to solve everyday problems. S4 subjects are also still having difficulties. As in problem number three, S4 has not been able to use mathematical concepts, facts, and procedures to solve everyday problems. The S4 also struggled when determining a formula for sealing the surface area of tupperware without a lid. So that the calculation made by S4 is also not correct. Then in the third indicator of mathematical literacy ability, namely providing interpretation using reason or argumentation, S4 is also not appropriate when providing arguments that are appropriate to the context.

Based on the description above, it can be said that students with idealist personalities have not been able to meet all indicators of mathematical literacy ability completely. Where students have not been able to use mathematical concepts in everyday life and students have not been appropriate in providing arguments related to the answers given. This is in line with research conducted by (Kasrina & Rasid Ode, 2019) which states that in implementing a problem-solving plan, students of idealist subjects are wrong in the calculation stage.

Seeing the problems of students with rational and idealist personality types, this is possible because students do not understand the context of the problem in the problem, According to Roebyanto and Harmini (Nisa & Faradiba, 2023), the right solution step refers to the use of the right   technique or way of solving problems, so that it can help find procedures to produce the right solution. Therefore, there needs to be a change in learning activities.

Teachers as facilitators need to design and implement appropriate strategies, especially for students with medium and low literacy skills. Learning activities will be more meaningful when the material to be learned is associated with contextual problems through apperception activities (Sholikin et al., 2022). According to (Syukri, 2020) providing contextualized problems that are integrated in learning will improve students' higher-order thinking skills, because it requires complex thinking so that solutions are not only obtained in one absolute way.

Conclusion

Based on the results of the research and discussion, the conclusions are as follows: (1) Students with Guardian personality types are able to meet all indicators of mathematical literacy, as demonstrated by their ability to create mathematical models using mathematical symbols, apply appropriate reasoning with equations and strategies, and then reinterpret the results in real-world contexts. (2) Students with Artisan personality types have not been able to fully meet all indicators of mathematical literacy. These students struggled to correctly interpret or argue the conclusions of their answers. (3) Students with Rational and Idealist personality types have also not been able to fully meet all indicators of mathematical literacy. They have difficulty applying mathematical concepts to everyday life and have not provided appropriate arguments related to their answers.

References

Astuti, W., & Wijaya, A. (2020). Learning trajectory berbasis proyek pada materi definisi himpunan. *Jurnal Riset Pendidikan Matematika*, *7*(2), 254–266. https://doi.org/10.21831/jrpm.v7i2.16483.

Hera, R., & Sari, N. (2015). *Seminar Nasional Matematika Dan Pendidikan Matematika UNY 2015 713 Literasi Matematika: Apa, Mengapa dan Bagaimana?* 713–720.

Kasrina, & Rasid Ode. (2019). Eksplorasi Kemampuan Pemecahan Masalah Matematika Ditinjau Dari Tipe Kepribadian Idealis dan Rasional Mahasiswa Universitas Darusalam Ambon. *PEPATUDZU: Media Pendidikan Dan Sosial Kemasyarakatan*, *15*(2), 109–117.

Keirsey, D. (1998). Please Understand Me II: Temperament, Character, Intelligence. In *Prometheus Nemesis*.

Masfufah, R., & Afriansyah, E. A. (2021). Analisis Kemampuan Literasi Matematis Siswa melalui Soal PISA. *Mosharafa: Jurnal Pendidikan Matematika*, *10*(2), 291–300. https://doi.org/10.31980/mosharafa.v10i2.825.

Masjaya, & Wardono. (2018). Pentingnya Kemampuan Literasi Matematika untuk Menumbuhkan Kemampuan Koneksi Matematika dalam Meningatkan SDM. *PRISMA, Prosiding Seminar Nasional Matematika*, *1*, 568–574.

Monica, B. C. (2023). *Analisis Kemampuan Literasi Matematis Ditinjau Dari Tipe Kepribadian Keirsey*. Universitas Siliwangi.

NCTM. (2000). Principles and Standars for School Mathematics. In *The National Council of Teachers of Mathematics, Inc* (Vol. 6, Issue August).

Nisa, F., & Faradiba, S. S. (2023). Profil Literasi Matematis Peserta Didik Berdasarkan Level Kemampuan Pemecahan Masalah Soal PISA. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *7*(2), 1003–1019. https://doi.org/10.31004/cendekia.v7i2.2211.

Nismaya, N. (2018). Analisis Tipe Kepribadian Siswa Dan Pengaruhnya Terhadap Kemampuan Pemecahan Masalah Matematika Menggunakan Model Pembelajaran Problem Based Learning. *Symmetry: Pasundan Journal of Research in Mathematics Learning and Education*, *3*, 41–55. https://doi.org/10.23969/symmetry.v3i1.1318.

Nurani, M., Mahfud, M. S., Agustin, R. L., & Kananda, H. V. (2020). Analisis Kemampuan Literasi Matematika Siswa SMA Ditinjau dari Gender. *Jurnal Pendidikan Matematika Universitas Lampung*, *8*(4), 336–347. https://doi.org/10.23960/mtk/v8i2.pp336-347.

OECD. (2019a). PISA 2018 Assessment and Analytical Framework. In *OECD Publishing*.

OECD. (2019b). PISA 2018 Results Combined Executive Summaries. https://doi.org/10.1787/g222d18af-en.

Ojose, B. (2011). Mathematics literacy : are we able to put the mathematics we learn into everyday use? *Journal of Mathematics Education*, *4*(1), 89–100.

Praja, Fajrul Najmuddin Abdi Fuady, A., & Sari, F. K. (2021). Analisis Kemampuan Penalaran Matematis Siswa Kelas VIII MTs Sa Kebon Dalem Ditinjau Dari Self Confidence Pada Topik Aritmatika Sosial. *Jurnal Ilmiah Mahasiswa Sains Unisma Malan*, *16*(30).

Prasasti, G. P., Nugraheni, P., Darmono, P. B., Studi, P., Matematika, P., Purworejo, M., Purworejo, K., Tengah, P. J., & Prasasti, G. P. (2023). *Analisis Numerasi Siswa SMP pada Tipe Kepribadian Keirsey : Rational dan Guardian*. *1*(2), 818–826.

Rijali, A. (2019). Analisis Data Kualitatif. *Alhadharah: Jurnal Ilmu Dakwah*, *17*(33), 81. https://doi.org/10.18592/alhadharah.v17i33.2374.

Sholikin, N. W., Sujarwo, I., & Abdussakir, A. (2022). Penerapan Teori Belajar Bermakna untuk Meningkatkan Literasi Matematis Siswa Kelas X. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *6*(1), 386–396. https://doi.org/10.31004/cendekia.v6i1.1163.

Sirri, E. L., Ratnaningsih, N., & Mulyani, E. (2020). Analisis Kesulitan Peserta Didik Dalam Menyelesaikan Soal Kemampuan Berpikir Reklektif Matematis Ditinjau Dari Tipe Kepribadian. *Journal Of Authentic Research on Mathematics Education (JARME)*, *2*(1), 46–56.

Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Bandung*. Bandung: Alfabeta.

Susanti, V. D., & Maharani, S. (2016). *Profil Berpikir Mahasiswa Dalam Memecahkan Masalah Numerical Analysis Ditinjau Dari Tipe Kepribadian*. *6*(1), 62–72.

Syukri, M. (2020). Peningkatan Minat Belajar Siswa Melalui Model Pbl Berbasis Pendekatan Stem Dalam Pembelajaran Fisika. *Jurnal Pencerahan*, *14*(2), 1693–7775.