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Mathematical Literacy with Islamic Nuances Based on Prospective Mathematics Teachers' Personality

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Abstract. *Mathematical literacy is crucial to understand phenomena and good decision-making in real life. This study aims to describe aspects of Islamic nuanced mathematical literacy in prospective teachers, which were viewed from the four personalities of Keirsey. This qualitative descriptive research used a questionnaire of MTBI personality types and a mathematical literacy test with Islamic nuances. The subjects are students in the 7th semester of the mathematics education program at an Islamic university in Kediri City, East Java, Indonesia. The findings showed that rational and idealist subjects could fulfill the "formulating" indicator, but not the guardian and artisan subjects. They were not able to translate problems into mathematical form. The indicators of "employing" and "interpreting" show that subjects with rational personality types can determine better strategies than artisan, guardian, and idealist personality types. That is, it is necessary to integrate the interconnections between the mathematics learning programs related to Islamic elements. A more in-depth portrait of mathematical literacy is needed in different situations from prospective mathematics teachers at Islamic universities.*

Keywords*: mathematical literacy, keirsey's four personalities, mathematics with islamic nuances*

Introduction

In today's knowledge-based and technologically advanced society, literacy (i.e., the ability to understand, use, and interpret written texts) and numeracy (i.e., the ability to access, use, and interpret mathematical information) are typical skills. Demographic aging and technological advances in industrialized societies imply that adults will be increasingly required to update their skills throughout life. Literacy and numeracy are prerequisite keys for acquiring various forms of knowledge and skills (e.g., reading machine manuals, programming computers, or learning a foreign language) and, therefore, for lifelong learning in general (Lechner, Gauly, Miyamoto, & Wicht, 2021). This is in line with the objectives of the G20 international conference in the era of recovery from a global pandemic. Collective capabilities are needed to create a foundation for inclusive and sustainable growth, including in the world of education. Priority issues echoed as good practices in the world of education focus on improving fundamental competencies in the form of numerical literacy and character.

Numerical literacy, also known as mathematical literacy, is one of the life skills, involves the processes of problem-solving, evaluation, communication, and critical-creative thinking, and is considered at least as important as literacy in modern society (Sumirattana, Makanong, & Thipkong, 2017; Taskin & Tugrul, 2014). The functional purpose of mathematical literacy is to improve understanding of real-world phenomena and, therefore, to support good decision-making in all areas of life (Stacey & Turner, 2015). Mathematical literacy describes the individual's capacity to think and reason mathematically and to use mathematical concepts, procedures, facts, and tools to describe, explain and predict emerging phenomena (OECD, 2019). Mathematical literacy is intended for when individuals become adults, they can be useful and needed, both in the business world and social life (Nagasaki, 2015; Ojose, 2011).

Problems that are often encountered in the business world and society in the use of realistic data include: (a) incomplete or inconsistent, (b) providing rich information about the situation described, (c) entering complex mathematical data, (d) being approached in different ways, (e) based on a wide range of mathematical knowledge and skills, and (f) often asking individuals to use different representations in their solutions (Kramarski & Mizrachi, 2006). All aspects of mathematics in mathematical literacy are used actively by individuals, either through certain mathematical concepts and techniques or mathematical reasoning (Stacey & Turner, 2015), not remembering math formulas (Mevarech & Fan, 2018). Thus, individuals need a good understanding to develop related to pure mathematical concepts. Then the importance of exploratory involvement in the abstract world of mathematics through real-world-based tasks. (OECD, 2019; Stacey & Turner, 2015).

Mathematical literacy can be used to determine learning goals for all students; at any age or class, students can be judged proficient or not following these goals (Kilpatrick, 2001). Mathematics teaching in schools should aim to develop mathematical literacy and improve students' ability to use and apply mathematical knowledge to solve real-life problems or situations (Sumirattana et al., 2017). The teacher is the spearhead of this success. For an individual to acquire mathematical literacy skills in the curriculum, teachers must have these skills in the first place. Therefore, the prospective teacher should have a solid foundation in this skill (Taskin & Tugrul, 2014). Teachers, as student facilitators, play a role in determining learning objectives and designing activities to achieve goals. So teachers should be prepared at an early age to play their role in improving students' mathematical literacy, one of which is in learning and developing assessment literacy, mathematical knowledge for teaching, and related competencies (Koh & Chapman, 2019).

Previous research on the mathematical literacy of prospective teachers embraces elementary school teacher education and other programs. The study is limited to their skill, understanding, interpretation, prior knowledge, and mathematical communication, as well as how they support (Faulkner, Hannigan, & Fitzmaurice, 2014; Jupri & Rosjanuardi, 2020; Kabael, 2012; Oktaviyanthi, Agus, & Supriani, 2017; Riana & Zenizela, 2020; Shure, Rösken-Winter, & Lehmann, 2022; Umbara & Suryadi, 2019; Vila & Sanz, 2013). Meanwhile, prospective mathematics teachers include the development of strategies, connections, and modeling in mathematical literacy (Baumgartner, 2016; Botha & Van Putten, 2018; Rathburn, 2015).

A finding suggests empirically that adults' mathematical literacy is flexible through adulthood and can change even over a three-to-six-year period (Lechner et al., 2021). But in reality, many studies show that the concepts, perspectives, and self-confidence of teachers and prospective teachers toward mathematical literacy are quite low (Arslan & Yavuz, 2012; Colwell & Enderson, 2016; Novak & Tassell, 2017; Önal, Yorulmaz, GÖkbulut, & Altiner, 2017; Umbara & Suryadi, 2019; Yavuz & Erbay, 2015). They have indicated a lack of confidence and self-efficacy in providing mathematical literacy experiences for their learners (Arslan & Yavuz, 2012; Campbell, Gray, MacIntyre, & Stone, 2020). On the other hand, there is a positive moderate and high-level relationship between self-efficacy perception and the personality type of the prospective teacher (Güngör, Kurt, & Ekici, 2014). It means there is a chance to study prospective teachers' mathematical literacy skills in terms of psychological bias, specifically personality type.

Individual psychological differences deserve attention. The psychological condition of students is the basis for how they learn various things, overcome life problems, and face the business world. One of the individual psychological differences that are often the concern is a personality trait. Personality refers to the patterns of behavior consistently exposed by an individual. Personality contributes to an individual's enduring and distinctive pattern of feeling, thinking, and behaving (Cervone & Pervin, 2015). Therefore, personality traits have a great effect on the teaching profession. The classification of personality, based on the apparent behavior and way of thinking, has been developed by David Keirsey. He classifies personality into a guardian, idealist, artisan, and rational (Güngör et al., 2014). An overview of mathematical literacy skills is needed based on the personality of the prospective mathematics teacher. These portraits can be used as recommendations for good practice for improving mathematical literacy skills in higher education.

The context of literacy problems related to nature and the local culture has been found in several studies (Fithriyah, 2018; Oktiningrum, 2016; Zulkardi & Hartono, 2016). Islam, as the majority religion in Indonesia, has the potential to provide a unique and local context. Issues with Islamic nuances can include the division of inheritance, payment of zakat, and other worship. This context can be used as a support in measuring mathematical literacy (Dewi & Widyastuti, 2020). The contexts are very likely to be faced by Muslim-majority communities such as Indonesia, including prospective mathematics teachers. As a prospective mathematics teacher from an Islamic-based university, mathematical literacy related to Islamic problems is important for students to master. However, this context is still under limited study only from the perspective of students, and their support for integration into the sacred book of Muslims called al Quran (Idris, 2020). Therefore, this study intends to provide a holistic and in-depth standpoint related to the mathematical literacy aspects of Islamic-nuanced problems. Furthermore, this study aims to describe the mathematical literacy aspects of prospective teachers in view of Keirsey's four personalities.

Method

This study explores how mathematical literacy skills have Islamic content in prospective mathematics teachers. Therefore, this research is descriptive qualitative. Aspects of mathematical literacy with Islamic nuances from prospective mathematics teachers are described based on four personality types: Artisan, Idealist, Guardian, and Rational. The subjects of this study were selected purposively. The subjects are students in the 7th semester of the mathematics education program at an Islamic university in Kediri City, East Java, Indonesia. Students have taken practical internship courses at this level, and more than 50% of the courses are under the curriculum. Therefore, the subject is referred to as a prospective teacher.

The research instrument consisted of a personality questionnaire for the MBTI Test (Myers-Briggs Type Indicator), a mathematical literacy test with Islamic nuances, and interview guidelines. The MTBI test personality questionnaire was given to 43 prospective subjects along with mathematical literacy test questions. Furthermore, the subject is selected from the result of the MBTI Test; then, an interview process is carried out to clarify the description of the mathematical literacy aspects of the problem with Islamic nuances. Each Keirsey personality type was represented by one person. The selection was made because it was found that students filled out the personality questionnaire with each of the most dominant personalities. In addition, four subjects were selected with the criteria of good interpersonal communication skills based on three lecturers' recommendations.

Personality questionnaire instrument The MBTI test using the Keirsey personality type scale contains 40 statement items. The mathematical literacy with Islamic-nuanced problems test consists of three essay questions. The context used in mathematical literacy includes the law of zakat, inheritance, and other worship. Problems in the Islamic context can be imagined realistically and become literacy problems. This is because the context provides a sufficient reason why the problem deserves to be solved and also requires mathematical knowledge to solve it (OECD, 2019).

The first question indicator is given a stimulus about the law of zakat on commercial assets and some information on the combination of assets of the three entrepreneurs that satisfies the system of linear equations. Zakat is a certain part of the property that must be issued by every Muslim when it has reached the specified conditions or nisab. Then, students were asked to analyze the combined zakat they must pay. The second question is given a stimulus for the distribution of inheritance land area in the form of a flat figure with a trigonometric identity. Then students are asked to determine an inheritance right according to the given rules. For the third question, given a religious exhibition as a stimulus with an arrangement that involved a number pattern. Students are asked to determine a series of sequences related to the arrangement. Then, given some additional statements related to the need for materials for organizing the exhibition. Students were asked to test the truth of these statements and the reasons. It means the test contains three problems. The instrument mathematical literacy test was developed by researchers together with peer lecturers who are pursuing Islamic studies. It had been validated by a peer-to-peer mathematics education expert with the minimum criteria of a master's degree and 10 years of teaching experience. The results of descriptive content validation are in the valid category above 80%.

Interview guidelines were developed based on aspects of mathematical literacy (OECD, 2019). It can be seen in Table 1.

The data analysis used in this study refers to a technique presented by Miles and Huberman, which consists of (1) data reduction, (2) data presentation, and (3) conclusion drawing or verification (Miles & Huberman, 1994). The validity of the data was carried out by triangulation of test and interview methods, as well as member checking.

Table 1. Interview guidelines for mathematical literacy aspects

No	Aspects of Mathematical Literacy	Question Item
1	*Formulating situations mathematically* Students can: • Recognize and identify opportunities to use mathematical aspects in problem situations • Provide the necessary mathematical structure or representation to formulate problems that are contextualized into mathematical form.	• Do you understand the answers to each question you are working on? If not, why? If so, what are the processes and steps you took to formulate the given problem? • Do you transform each defined problem into mathematical form? If not, why? If so, explain how you transform the defined problem. • Do you use appropriate variables, symbols, diagrams, or standards to represent problems using formal mathematical symbols? If not, why? If yes, try to explain why to use these mathematical symbols. • Have you planned the strategy that will be used to solve the problem in the given problem? If not, why? Please explain how you plan your strategy to solve the problem and what?
2	*Employing mathematical concepts, facts, procedures, and reasoning* Students are able to • Design and implement a strategy to solve the problem • Apply the concepts, facts, and procedures, and perform calculations and	• Do you check the implementation of your strategy to lead to a solution? If not, why? If so, explain how you checked the implementation of the strategy to solve the problem. Why did you use that strategy? • Are you able to represent a conclusion on each test result? If not, why? If so, how would you represent that conclusion? • Do you use math tools (calculator/software/measuring tools) in doing the questions? If not, why? If so, why did you use this tool?

No	Aspects of Mathematical Literacy	Question Item
	manipulations to find the mathematical solution.	
3	*Interpreting, applying, and evaluating mathematical outcomes* Students can: • Reflect on mathematical solutions or conclusions, and interpret them in the context of real-world problem • Determine whether the results or conclusions make sense	• Did you check the solution you got according to the conditions or limitations of the problem? If not, why? If so, how do you check it? Why does your solution fit the context of the problem? • What representations do you use to interpret the suitability of the solution to the context of the problem? If not, why? If so, how do you use that representation? • Do you use mathematical tools (calculators/software/measuring tools) to ensure the reasonableness of the solution to the context of the problem? If not, why? If so, how did you use the math tool?

Results and Discussion

From the results of questionnaires and tests, four subjects were selected. Each personality was chosen as a subject to be interviewed. Artisan subjects are marked with S1, Idealist subjects are marked with S2, Guardian subjects are marked with S3, and Rational subjects are marked with S4.

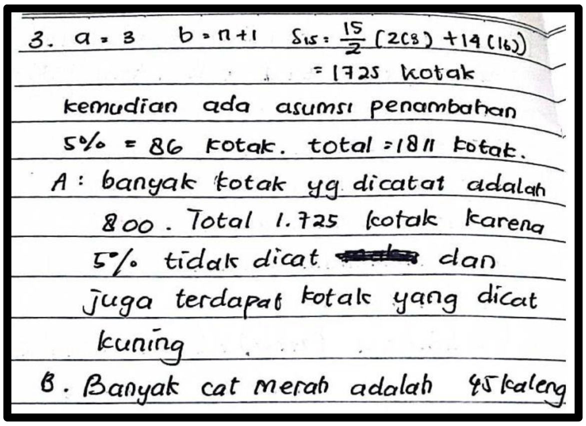
Aspects of Mathematical Literacy with Islamic Nuances Artisan Subject

Artisan subjects generally do not fulfill every aspect of mathematical literacy except "formulating". The solution given does not use the concept properly and is interpreted sensibly. For example, in item 3, the solution for S1 is shown in Figure 1.

1. Formulating situations mathematically

S1 is able to identify the mathematical aspects of the problem. Then S1 formulates a mathematical representation of the situation in the problem. S1 uses mathematical symbols and appropriate models, such as variables, systems of quadratic equations, and the area of triangles. However, not in item 3. From Figure 1, it is found that S1 did not write down the structure of the sequence that emerged, meaning that S1 did not recognize the given situation. Here is the transcript of the interview.

R	:	*What is your understanding regarding this matter?*
S1	:	*The statements A and B are known. As for what number sequence is generally, what is sought is Sn. How many squares are needed to make this 15-grid arrangement? We get 1725 squares. It is assumed that plus 5% of 1725, the result is 86. So, the total of all squares is 1811.*
R	:	*For the next part of the question, what did you get?*
S1	:	*The number of boxes painted red is 800, ma'am. For this, I asked to count again or asked (check) if it was true or false. Maybe it is my fault. Because I didn't write that A is wrong if it's 800, and B is right or wrong 45 cans.*


3. a = 3 b = n+1 $S_{15} = \frac{15}{2}(2(3) + 14(16))$
= 1725 kotak
kemudian ada asumsi penambahan
5% = 86 kotak. total = 1811 kotak.
A : banyak kotak yg dicatat adalah
800. Total 1.725 kotak karena
5% tidak dicat dan
juga terdapat kotak yang dicat
kuning
B. Banyak cat merah adalah 45 kaleng

English Translation:

$a = 3, b = n + 1, S_{15} = \frac{15}{2}(2(3) + 14(16))$

$= 1725$ Box

There is the additional assumption of $5\% = 86$ boxes, a total of 1811 boxes

A = the number of boxes recorded are 800. A total of 1725 boxes were because 5% did not paint, and some boxes were painted yellow.

B = the number of red paints is 45 cans

Figure 1. Solution of S1 in item number 3

2. Employing mathematical concepts, facts, procedures, and reasoning

S1 is able to find three strategies in item 1, then execute one strategy. Subjects also use mathematical tools such as calculators to find solutions that they think are appropriate. In item 2, S1 uses one strategy as a result of abstracting the mathematical representation obtained from the problem, but it is incorrect. So the strategy that S1 does is not in accordance with the actual conditions of the problem. Likewise, in item 3, it can be seen in Figure 1 that S1 failed to apply the mathematical structure, namely the triangle sequence, into an arithmetic sequence. So it failed to get the right solution.

R : *In the next question, you write down a=3, b=n+1, then finally, you get the result into the formula you wrote down; how is the process?*

S1 : *The formula for the sum of the series Sn=n/2(2a+(n-1)b). Because I see from the picture (the pattern), the first (terms) are 3; then there are 6, then, if you look for the difference, it's n+1, for example, first three-plus 2+1=3, 3+3=6, 6+4= 10, so ma'am. But if it's added on for too long, there's a formula.*

R : *Does that mean you feel more effective using this formula?*

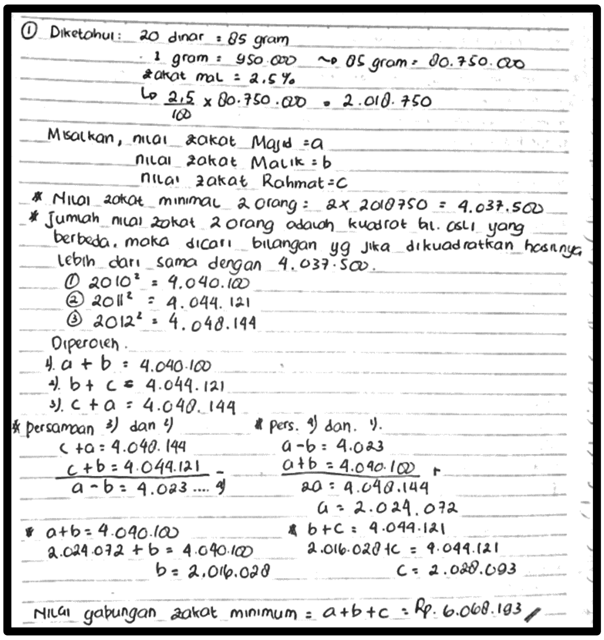
S1 : *Yes*

3. Interpreting, applying, and evaluating mathematical outcomes

S1 does not carry out the process of interpreting, applying, and evaluating the results in the interview process on item 2 and item 3. Even though he does the process of interpreting mathematical results to the real-world context in item 1, however, he still does not recognize the limitations given by the problem. S1 does not understand how the problem of zakat maal can affect the results and calculations of mathematical procedures. Zakat maal is issued at least by everyone if it has fulfilled the nisab. This information is not used by S1 in interpreting the results.

Aspects of Mathematical Literacy with Islamic nuances Idealist Subject

In general, the Idealist subject is able to fulfill the "formulating" aspect. However, it does not meet the indicators of the “employing” aspect. The limitations of his strategy cause him to use facts and concepts that are not in accordance with the stimulus. For example, in item 1, the solution for S2 is shown in Figure 2.



① Diketahui: 20 dinar = 85 gram
1 gram = 950.000 → 85 gram = 80.750.000
zakat mal = 2,5%
↳ $\frac{2,5}{100}$ × 80.750.000 = 2.018.750
Misalkan, nilai zakat Majid = a
nilai zakat Malik = b
nilai zakat Rahmat = c
* Nilai zakat minimal 2 orang: 2x 2018750 = 4.037.500
* Jumlah nilai zakat 2 orang adalah kuadrat bl. asli yang berbeda, maka dicari bilangan yg jika dikuadratkan hasilnya lebih dari sama dengan 4.037.500.
① 2010^2 = 4.040.100
② 2011^2 = 4.044.121
③ 2012^2 = 4.048.144
Diperoleh.
1). a + b = 4.040.100
2). b + c = 4.044.121
3). c + a = 4.048.144
* persamaan 3) dan 2)
c + a = 4.048.144
c + b = 4.044.121 −
a − b = 4.023 ... 4)
* pers. 4) dan 1).
a − b = 4.023
a + b = 4.040.100 +
2a = 4.048.144
a = 2.024.072
* a + b = 4.040.100
2.024.072 + b = 4.040.100
b = 2.016.028
* b + c = 4.044.121
2.016.028 + c = 4.044.121
c = 2.028.093
Nilai gabungan zakat minimum = a + b + c = Rp. 6.068.193

Figure 2. Solution of S2 in item number 1

English Translation:
Given: 20 dinar = 85 grams
1 gram = 950.000 → 85 grams = 80.750.000
Maal zakat = 2,5%

$$\frac{2,5}{100} \times 80.750.000 = 2.018.750$$

Let the value of Majid's Zakat $= a$, the value of Malik's Zakat $= b$, the value of Rahmat's Zakat $= c$
The total minimal zakat of two persons is a different square of natural number, then find the number if the square is greater than 4.037.500
1. $2010^2 = 4.040.100$
2. $2011^2 = 4.042.121$
3. $2012^2 = 4.048.144$

We get,
1.$a + b = 4.040.100$
2. $b + c = 4.042.121$
3. $c + a = 4.048.144$

* Equation 3) and 2)
… *(The process like beside)*
* Equation 4) and 1)
… *(The process like beside)*

The total value of minimum zakat $= a + b = c = Rp. 6.068.193$

1. Formulating situations mathematically

S2 is able to identify mathematical aspects and then represent the situation in the problem mathematically. S2 uses mathematical symbols and appropriate models such as variables, systems of quadratic equations, and the area of triangles. S2 is able to translate problems into mathematical language or appropriate representations. As in question 1, S2 writes and explains the value of assets that meet the nisab. Then S2 reveals the mathematical aspect in the form of variables that represent the zakat value of each entrepreneur. The following is a quote from the results of the interview with S2 in question 1.

R : *What do you understand about this?*
S2 : *If you read this question that is asked is zakat from Majid, Malik, and Rahmad, it is known in this question, zakat maal is issued if it meets the nisab, the nisab is 20 dinars or equal to 85 grams. In question, it is also known that the property of Majid, Malik, and Rahmad fulfills the nisab. It is also known that the value of Majid's zakat plus the value of Malik's zakat, the value of Malik's zakat plus the value of Rahmad's zakat, and the value of Rahmad's zakat plus the value of Majid's zakat is equal to the square of the original number which is different. The nisab is 20 dinars or 85 grams, 1 gram is worth 950,000. Then, for example, Majid's zakat is a, Malik's zakat b, and Rahmad's zakat is c.*

2. Employing mathematical concepts, facts, procedures, and reasoning

S2 is able to find strategies for each question, although not all of them are effective. The strategy in problem 1 uses facts that are not in accordance with the problem, and question 2 uses trigonometric concepts incorrectly and is not fully executed. However, on 3 S2 questions, he was able to make generalizations from the results of applying the registration procedure until he found the right solution. S2 also reflects on the mathematical arguments he used in the final solution to justify or condemn his mathematical results. The following is a quote of the results of the S2 interview in question 1.

S2 : *Because for a minimum amount of zakat, two people are 4,037,500, so look for (the value of natural numbers) whose number, if squared, is equal to or more. The 85 grams were then multiplied by 950,000 to arrive at 80,750,000. For zakat maal 2.5%, it means that the zakat maal is 2.5% multiplied by 80,750,000, equaling 2,018,750. From what is known, for example, variables a, b, and c, it is also known that the amount of zakat from these two people is at least two times the amount of 2,018,750. So, the minimum for these two people is 4,037,500 (if rooted in 2009,35). Then we get this equation, a+b = (2010)2. For the second and third equations, it's the same as well. Then we find the values of a, b, and c. To find it using the usual elimination method. Because what is being asked is a combination of zakat from 3 people that can be given to zakat recipients, we combine (sum) the values of a, b, and c, so we get a value of 6,068,193.*

3. Interpreting, applying, and evaluating mathematical outcomes

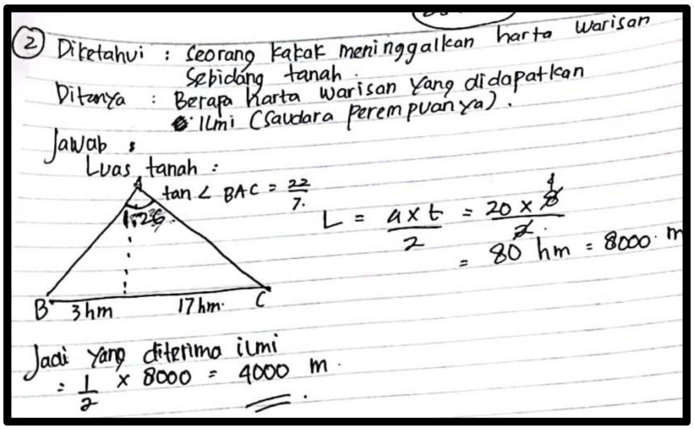
S2 carries out the process of interpreting mathematical results back to the real-world context in question 1. At least if everyone has fulfilled the nisab, the zakat maal is issued. However, he did not recognize the context presented in the problem that the product of the squares of natural numbers was already in millions. S2 does not use this information in interpreting the procedures it performs. In problem 3, Masters understands how the real world affects results and calculations. S2 contextualizes how the results should be adjusted or applied to the number of cans it obtains, which cannot be a fraction. The following is a snippet of the S2 interview in question 1.

R : *When you are done doing this calculation, did you have time to check the solution so that it fits the problem?*

S2 : *Yes, ma'am, I had time. If I check it like this, I already get the values of a, b, and c; then I look at the question, what is being asked? If it is known, the answer is 6 million, oh, it is in accordance with the minimum amount.*

Aspects of Mathematical Literacy with Islamic Nuances Guardian Subjects

The general description of the Guardian subject does not address every aspect of mathematical literacy except "formulating". The solutions obtained in questions 1 and 2 do not use the right facts and concepts, so the final answer is not right. Answers are also not interpreted within the given context. For example, in item 2, the solution for S3 is shown in Figure 3.


② Diketahui : seorang kakak meninggalkan harta warisan sebidang tanah.
Ditanya : Berapa harta warisan yang didapatkan Ilmi (saudara perempuanya).
Jawab :
Luas tanah :
A
tan ∠ BAC = 22/7
1,26
$L = \frac{a \times t}{2} = \frac{20 \times 8}{2}$
$= 80$ hm $= 8000$ m
B 3hm 17hm C
Jadi yang diterima ilmi
$= \frac{1}{2} \times 8000 = 4000$ m.

English Translation:
Given: An older brother died and left an inheritance, a plot of a land
Question: How much inheritance for Ilmi as his only sister
Answer:
Area of Land
… *(The process like beside)*
Hence, Ilmi accept the inheritance $= \frac{1}{2} \times 8000 = 4000$ m

Figure 3. Solution of S3 in item number 2

1. Formulating situations mathematically

S3 can identify mathematical aspects and then mathematically represent the problem's situation. S3 uses mathematical symbols and appropriate models such as variables, systems of quadratic equations, and the area of triangles. S3 can translate problems into mathematical language or appropriate representations. However, in question 3, part 1, S3 did not recognize the situation given in the question. The following is an exposition of the interview results.

P	:	*How did you understand this question to get your answer?*
S3	:	*It is known that the plot of land is in the shape of a triangle, the inheritance obtained by Ilmi, a sister. If the sister has the right to inherit half of her brother's property, I will continue to look for the area of the land.*

2. Employing mathematical concepts, facts, procedures, and reasoning

S3 can find strategies for each question. In questions 1 and 3, the strategy was successfully carried out, and a solution was obtained. However, in question 2, he did not succeed in executing his strategy because the chosen strategy was not effective. As in Figure 3, S3 uses the wrong triple of Pythagorean and does not match the information from the problem. Even though he used a calculator to find a solution, it didn't work. Next, S3 can generalize from the results of applying the registering procedure he did so that he can find a solution to problem 3, part 2. S3 also reflects the mathematical arguments he has obtained in the final solution to make a right or wrong decision. The following are the results of the interview with S3.

S3	:	*I didn't know it was the height, the area of the triangle is times the base times the height. Suppose the base is 20 of 17+3, if the height I find 8. Then the area is 80 hm. Then I turned it into meters so that the area was 8000. Previously, the division of property for my sister was of the property, of 8000 was 4000, so the inheritance that Ilmi got was 4000 m.*
R	:	*When you create a mathematical model like this, how does the process to get 1.26?*
S3	:	*That's the angle found 1.26 tan BAC = 22/7… I thought there was a Pythagorean triple, but I looked for it and couldn't find it. Finally, I used a Pythagorean triple, 8 and 17*

R : *Have you thought of any other strategy for finding the height of triangle ABC?*
S3 : *I thought about using the tangent, but I couldn't find it, so I ended up using the Pythagorean triple.*
R : *Then why is the final result multiplied by?*
S3 : *Because if the sister's inheritance is of the total. Suppose it's a 2/3 male or something like that.*
R : *Did you ever use math tools in the process of getting these answers?*
S3 : *Once, I calculated it using a calculator.*

3. Interpreting, applying, and evaluating mathematical outcomes

S3 does not carry out the process of interpreting, applying, and evaluating the results in the interview process on questions 2 and 3. Even though he interprets the mathematical results back to the real-world context in question 1, he still does not recognize the limitation given by the question, namely the minimum value of the zakat combination that satisfies the given properties. S3 understands how the zakat maal problem can affect the results and calculations of mathematical procedures but does not check the suitability of the answers to the problem. In problem 3, S3 understands how the real world affects the results and calculations of mathematical procedures or models. S3 contextualizes how the results should be adjusted or applied to the number of cans it obtains, which cannot be a fraction.

R : *Have you checked the reasonableness of the solution?*
S3 : *The fairness is like this, Ma'am, if the area is 8000, if it's half for girls, it's 4000, I think it's just like that.*

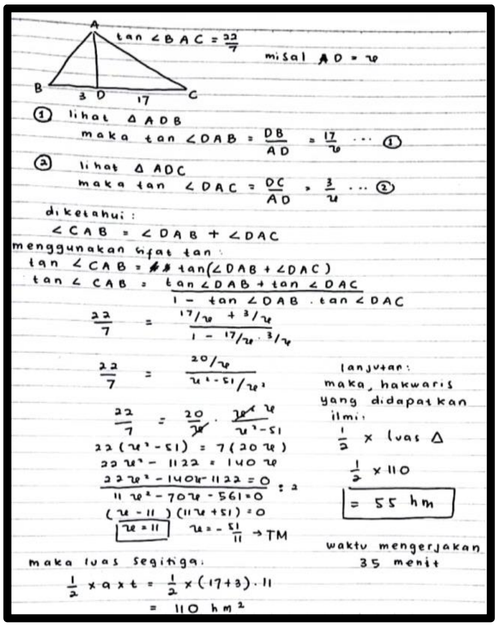
Aspects of Mathematical Literacy with Islamic Nuances Rational Subject

Rational subjects fulfill every aspect of mathematical literacy in each number. However, situations involving formulated quadratic numbers do not fit the context. So, when an effective strategy is executed, it produces an incorrect answer. In all questions, answers are also interpreted within the given context. For example, in item 2, the solution for S4 is shown in Figure 4.

1. Formulating situations mathematically

S4 can identify mathematical aspects by using mathematical symbols and appropriate models. For example, variables, systems of quadratic equations, trigonometry, and triangles. S4 can translate problems into mathematical language or appropriate representations. Namely by re-drawing the context in a flat shape. From the results of the following S4 interview, it appears that he formulated the objectives of the problem in his own words.

R : *How did you understand this problem?*
S4 : *This means that you are asked to find the area of a triangle and then multiply it by half. Because the ground is triangular, then the purpose of the problem is to look for an inheritance; it turns out that Ilmi got the area of this triangle.*



English Translation:
Picture

Let $AD = x$

1. Note ΔADB
   Then tan = … *(The process like beside)*
2. Note ΔADC
   Then tan = … *(The process like beside)*

Given:

$$\angle CAB = \angle DAB + \angle DAC$$

Using the property of tangent
… *(The process like beside)*

… $x = \frac{51}{11}$ (Not satisfied the context)

Hence, The Area of the Triangle

$$\frac{1}{2} \times a \times t = \frac{1}{2} \times (17 + 3) \times 11$$
$$= 110 \text{ hm}^2$$

Therefore, the inheritance for Ilmi

$$\frac{1}{2} \times area\ \Delta$$
$$\frac{1}{2} \times 110 = 55 \text{ hm}$$

Figure 4. Solution of S4 in item number 2

2. Employing mathematical concepts, facts, procedures, and reasoning

S4 can find strategies for each question. In question 1, S4 had time to think about the procedure for finding the value of each variable involved. In question 2, S4 can manipulate the given graphical information. S4 draws an altitude line and then creates two triangles that compose the previous triangle. Next, S4 applies rules such as the tangent of the sum of the angles and the area of the triangle exactly. Next, S4 can generalize from the results of applying the listing procedure he did to find a solution to problem 3. S4 also reflects the mathematical arguments he has obtained in the final solution to justify his mathematical results.

S4	:	*So the first step to solve this is to find the triangle area first. So, here are some pointers; first, there is triangle ABC, with tan BAC = 22/7. Then, I assume AD = x to make it easier and not too long. Well, tangent of BAC can be further divided (corner) DAB and DAC. Well, I split into two. I look for tanngent of DAB, tanngent of DAC, then I use the property of tangent.*
R	:	*Why did you think of using such a method then?*
S4	:	*Because we know tan BAC, we must use tan BAC. So I spread the angle BAC equal to the DAB plus the DAC. So if I look for the tangent of BAC, it is the same as the tangent of the DAB plus DAC.*
R	:	*So you used the sum tangent formula, didn't you?*
S4	:	*Yes, because the values for the right and left must be the same, I will continue to calculate the right one and equate it with 22/7. Then after that, in the end, I got x=11 and x=-51/11.*
R	:	*Have you ever thought of any other way besides this method??*
S4	:	*If (the method) was tried, ma'am, in the end, I was confused; at first, I wanted to find the area one by one, but the tangent was not used. But finally, I found a way how to use tan BAC. If I think that what is known should be used, if it is not used, it ends up being confused, and I can't find the answer. So I make the triangle two, then add up the angles*

3. Interpreting, applying, and evaluating mathematical outcomes

The interview process with S4 showed that S4 did not carry out the process of evaluating the results of question 1. From his answers, he carried out the process of interpreting the mathematical results back into the real-world context by giving a million units in the final result. However, S4 still does not recognize the limitations given by the question. S4 does not understand how the problem of zakat maal can affect the results and calculations of mathematical procedures. Zakat maal is issued at least by everyone if it has fulfilled the nisab. This information is not used by S4 in interpreting the results. In problem 2, S4 explains why the results or mathematical conclusions can make sense in the context of the problem; namely, the height of the triangle cannot be negative, and so a positive solution is chosen. For item number 3, S4 understands how the real world affects the results and calculations of mathematical procedures or models. S4 makes a contextual assessment of how the results should be adjusted or applied to the number of cans it obtains cannot be a fraction.

S4	:	*If it's long, it can't be negative, ma'am. So the negative does not meet.*
P	:	*It means that at this stage, you check the fairness of the answer, right?*
S4	:	*Yes, then after I choose x=11, I substitute it into the height of the triangle; while the area of the triangle is half the base times the height, the base is 17+3, and the height that I found earlier is 11. So times 20 times 11 is the same as 110. Since the share of the inheritance (Ilmi) is part, then it is multiplied by again, so 55 hm.*

Mathematical literacy abilities with Islamic nuances in the four personalities can be viewed from the "formulating" aspect. Idealist and rational subjects formulated context better than artisan and guardian subjects. This is because idealist and rational subjects can translate the given problem into a suitable representation or model. The idealist temperament is identified as successful in academic life and is rationally judged to be independent and self-contained (Güngör et al., 2014). Meanwhile, Artisan and Guardian subjects have something in common when they cannot recognize some given mathematical situations. This condition is related to the ability to connect mathematics with the problems of everyday life, especially problems in religious life. Supported by previous research, guardian and artisan temperaments were found in low to moderate mathematical connections (Prasetyo, Dwidayati, & Junaedi, 2017). Translating a situation into a mathematical model is often called mathematization. This process has a role in one's success in “formulating”. Through the mathematization process, learners could engage with the context and its relevance to the real world, intending to create a problem-solving model that is presented, and ultimately interpret and validate the results that have been achieved (Botha & Van Putten, 2018).

In the aspect of "employing," it can be seen from the data obtained that rational subjects most successfully fulfill all indicators. Starting from finding strategies for each problem, manipulating the representations made, applying certain concepts, generalizing from a procedure carried out, and using mathematical aids appropriately. This is because the knowledge of effective strategies executed by rational subjects is more qualified than other subjects with personalities. As a result, the subjects of artisans, guardians, and idealists apply strategies that do not match the given stimulus. Qualitatively, there is no difference in the aspect of "employing" when viewed from the personality of prospective teachers. Personality shows how a person thinks. The previous results revealed no significant difference between the thinking styles of prospective mathematics teachers and their problem-solving strategies (Güner & Erbay, 2021). The selection of the right strategy is closely related to decision-making and information management. In line with that, individuals' personality influences how they process information and make decisions (Rao & Lakkol, 2022). Whether the mathematics problems were non-standard or standard, problem-solving strategies worked as a complete mediator. Effective mathematics teachers should pay more attention to problem-solving strategies (Zhao, Teng, Li, Li, Wang, Wen, & Yi, 2019).

The last aspect related to interpreting, applying, and evaluating the results is also best mastered by the rational subject. Rational subjects understand how the real world affects the results and calculations of mathematical procedures or models, such as the height cannot be negative and the number of cans cannot be in the form of a fraction. Meanwhile, other personality subjects did not check the suitability of the final answer with the context or stimulus given to problems related to the distribution of inheritance in the form of land area. Ability to evaluate through the checking process of temperament Rational better the nature of prudence. The rational person has an even-tempered nature (Güngör et al., 2014). The interesting thing is that all the subjects did not recognize the limits of how the nisab rules on zakat maal can affect the final results obtained. All subjects did not use information related to nisab in examining the solutions obtained. Errors in the problem-solving process that are not realized by the solver are often called metacognitive blindness (Goos, 2002). Consideration of the final results is part of the evaluation activity, but the solver has experienced an error (Huda, Sutawidjaja, Subanji, & Rahardjo, 2018; Wulan, Subanji, & Muksar, 2021).

Conclusion

This study aims to describe a portrait of mathematical literacy with Islamic-nuanced based on the personality of prospective mathematics teachers. Mathematical literacy is measured through three mathematical processes. In the indicator of "formulating," the Rational and Idealist subjects could translate the problem into mathematical form, but not the Guardian and artisan subjects. The "employing" indicator shows that subjects with rational personality types are able to determine strategically in the use of mathematical concepts strategically and are successfully compared to Artisan, Guardian, and Idealist personality types. In the three personality types, the subject cannot show which strategy is effective and cannot reach the right final solution. But all subjects could answer the questions correctly with Islamic mathematical literacy questions with the sequence of numbers which were relatively easier to predict. The "interpret" indicator shows that subjects with rational personality types can check the reasonableness of the solution, but not in other types.

It is necessary to have policies and management in learning or lectures at the Tadris Mathematics study program, IAIN Kediri, using assessment in high-order thinking skill-oriented problems. It is hoped that students will be able to improve mathematical literacy, especially Islamic mathematics, and the integration of interconnections between Islamic content in pedagogic and mathematical content in the Tadris Mathematics study program is needed. The next research should include increasing mathematical literacy through certain models or learning media, then testing the effectiveness. In addition, it can also be followed up by examining differences in Islamic mathematical literacy levels based on psychological differences or other mathematical abilities.

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