



Students' Mathematical Problem Solving Ability In *Faraidh*

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Abstract

Problem solving ability is a process to find a combination of a number of rules that can be applied in an effort to overcome new situations. This study aims to describe students' mathematical problem solving in faraidh science. This research is a qualitative research with a case study approach. The subjects in this study consisted of 3 people with high, medium and low mathematical abilities. The instrument used is a faraidh problem-solving test in the form of fractional questions and interviews. Data analysis was carried out to describe students' ability in problem solving supported by test and interview results, followed by drawing conclusions. Based on the results of the study, subjects with high abilities have good solving skills, as evidenced by all stages of problem solving that are met by highly skilled subjects starting from answering questions and interviews. Subjects with medium ability have sufficient problem-solving skills on the faraidh problem, it is proven that the subject is not right in solving problem solving and the subject is not right in explaining. Low-ability subjects have sufficient problem-solving skills on the faraidh problem, it is proven that the subject has not been able to explain problem solving.

Abstrak

Kemampuan pemecahan masalah adalah suatu proses untuk menemukan kombinasi dari sejumlah aturan yang dapat diterapkan dalam upaya mengatasi situasi baru. Penelitian ini bertujuan untuk mendeskripsikan pemecahan masalah matematis siswa pada ilmu faraidh. Penelitian ini merupakan penelitian kualitatif dengan pendekatan studi kasus. Subjek dalam penelitian ini terdiri dari 3 orang dengan kemampuan matematika tinggi, sedang dan rendah. Instrumen yang digunakan adalah tes pemecahan masalah faraidh yang berupa soal pecahan dan wawancara. Analisis data dilakukan untuk mendeskripsikan kemampuan siswa dalam pemecahan masalah didukung hasil tes dan wawancara kemudian dilanjutkan dengan penarikan kesimpulan. Berdasarkan hasil penelitian, Subjek dengan kemampuan tinggi memiliki kemampuan pemecahan yang baik, terbukti dari semua tahapan pemecahan masalah yang dipenuhi oleh subjek berkemampuan tinggi mulai dari menjawab soal serta wawancara. Subjek berkemampuan sedang memiliki kemampuan



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pemecahan masalah yang cukup pada masalah faraidh, terbukti bahwa subjek belum tepat dalam menyelesaikan pemecahan masalah dan subjek belum tepat dalam menjelaskan. Subjek berkemampuan rendah memiliki kemampuan pemecahan masalah yang cukup pada masalah faraidh, terbukti bahwa subjek belum dapat menjelaskan pemecahan masalah.

Introduction

Mathematical claims, ideas, and cognitive processes can all be expressed in one language, which unifies science and formulas. Mathematics plays a very important role in strengthening and being able to serve all fields of science. The definition of mathematics includes: 1) Mathematics is not a subject that can be developed on its own, but its existence will primarily aid people in overcoming social, economic, and environmental issues, 2) The king and the subject of mathematics are other fields, 3) Mathematical exploration of structures and patterns searches for patterns in dispersed systems and distinctions in what appear to be regular structures, 4) The use of mathematics to solve problems in social and economic life and to reveal the mysteries of nature (Aminah & Yazidah, 2018). Mathematics is one of the fields of science that is commonly used in everyday life, including inheritance calculus. In fractions, it is stated that as described above, there is a connection between mathematics and *faraidh* (Ula et al., 2020).

Mathematics and *Faraidh* have a tight relationship. Mathematics, being a branch of mathematics, aids Muslims in distributing the inheritance of the deceased in accordance with the standards of Islamic law as stated in the Qur'an and Hadith, and they cannot be separated from one another. *Faraidh* is a branch of Islamic law that studies the procedures and calculations for the distribution of inheritance to each successor (Sulistyo et al., 2021). However, in practice, the majority of students find it difficult to master Fiqh Mawaris because of *faraidh* content. Due to the material's lack of interest and boredom, students struggle to follow along when learning *faraidh*. Furthermore, among the problems faced by students in *faraidh* learning is the existence of mathematical calculations in solving problems of inheritance distribution to each heir. This factor is one of the causes of the low learning outcomes of students because they are not able to achieve competence in learning *Fiqh Mawaris*. Whereas the calculations in the *faraidh* material mostly use the concept of simple fractional calculations that have been studied at the previous school level (Kahfi & Hayati, 2022).

In addition, in learning mathematics problem solving is one of the most important parts in mathematics. Problem solving needs to be owned by every student in order to be able to solve problems well. In realizing this, every student from all levels of education needs to gain learning experience to develop problem-solving abilities. Efforts that can be made by teachers are to create a meaningful learning for students, and with this it is expected to have an effect on students' mathematical problem solving abilities.

Additionally, teachers frequently promote students' problem-solving skills by beginning lessons with open-ended questions that are created in accordance with the students' prior knowledge or experiences. In other words, the methodology used in this classroom inevitably fosters students' desire to learn mathematics in meaningful ways (Intaros et al., 2014). Additionally, problem-solving demands a range of abilities, including the ability to analyze information, organize and work methodically, check findings, and explore alternative strategies (Muir et al., 2008). In this study, researchers used Polya's problem-solving stages, namely understanding the problem, designing a plan, carrying out problem solving and checking again (Polya, 1981).

Based on the observations of researchers at MAN 2 Aceh Tengah, students considered *fiqh* lessons about *faraidh* a difficult lesson to understand so most of them were lazy to deepen this lesson. Many students do not understand the *faraidh*. The students think that the science of *faraidh* is as complicated as mathematics. This is because the discussion and learning in *faraidh* is closely related to the fraction material in mathematics learning. This is consistent with the findings of Juhdi, Nursupriana, and Misri's research from 2017, which found that many Muslims disregard the application of *shari'a* inheritance in the distribution of inherited property because it is thought to be difficult to calculate and requires a thorough understanding of *faraidh* literature (Juhdi et al., 2017). Based on this description, this study will discuss more about solving mathematical problems of students in *faraidh*. So that through the results of this study can be used as a motivation to understand more about the science of *faraidh*.

Method

This study is a qualitative research with the case study approach. The research was carried out at MAN 2 Aceh Tengah. The subjects in this study were 3 students who had high, medium and low mathematical abilities. In this study, the researcher used an instrument, namely a problem-solving test containing *faraidh* problems and interview guidelines. The following is a problem solving task of inheritance distribution used in this study.

Table 1. Problem solving tests in *Faraidh*

Problem
Dedi died leaving an inheritance of Rp. 600,000,000 and leave the heirs, namely his wife, 2 sons and 1 daughter and his mother. After 7 days of Dedi's death, the heirs wanted to share all the heirs. How much inheritance will the heirs get if the wife gets $\frac{1}{8}$ share, the mother gets $\frac{1}{6}$ share, and 2 sons 2 shares and daughter 1 share? a. Write down what you ask and know! b. Write a plan for the settlement of the distribution of the inheritance!

Problem
c. Determine how much wealth each of Dedi's heirs (his mother, wife, 2 sons and 1 daughter) earned!

In addition, researchers used Polya's problem-solving indicators in this study. The following are the stages of indicators that have been designed by researchers.

Table 2. Problem Solving Indicators

No	Stages	Problem Solving Indicators
1.	Understanding of the distribution of inheritance	Subjects are able to express what is known and asked appropriately
2.	Designing the settlement of the distribution of inheritance	The subject is able to determine the relationship between what is known and asked.
		The subject is able to make a faraidh problem solving plan
3.	Solve the problem of the distribution of inheritance	The subject is able to carry out the steps of the problem-solving design made
		Subjects can apply the designs that have been made
4.	Drawing conclusions from questions and answers	The subject re-examines the answers and is able to determine alternative solutions to solve the problem
		The subject checks the answer again by reading from the beginning and checking the calculation
		Subjects can understand the answers that have been checked and re-examine the questions and answers correctly

Results and Discussions

Initial data used to group subjects into three categories, namely high, medium and low. Subjects with high abilities were given the initials SA. The subject of SA in the first question at the stage of understanding the problem, the subject understands the information contained in the problem by writing down the information the wife gets $\frac{1}{8}$ part and the mother gets $\frac{1}{6}$ part and 2 boys get 2 parts and girls have 1 part and the subject can write down the information asked, namely how much did the heirs get, the subject is able to understand problem solving.

The subject of SA in designing plans, SA is able to relate the problem to fractions so that the subject designs the settlement of the part of the inheritance such as the division

of the wife $\frac{1}{8}$ mother $\frac{1}{6}$ and the division of children 2:2:5 and the mathematical model of the child's solution design $\frac{17}{24}$ then the subject is able to design a solution to the problem of dividing inheritance in accordance with what is written and what the researcher expects.

The SA subject is at the problem-solving stage, the subject is able to complete the steps that have been made as seen in the division of the subject can complete the multiplication of fractions so that the wife gets Rp. 75,000,000, the mother gets Rp. 100,000,000 and the distribution of boys each get Rp. 160,000,000 and women get Rp. 85,000,000.

Penyelesaian

$$\frac{1}{8} \times 600 = 75.000.000$$

$$\frac{1}{6} \times 600 = 100.000.000$$

dik. untuk pembagian anak

$$\text{Laki I} = \frac{17}{24} \times \frac{1}{2} \times 600$$

$$= \frac{34}{24} \times 600$$

$$= \frac{20.400}{24}$$

$$= 170.000.000$$

$$\text{Laki II} = \frac{17}{24} \times \frac{1}{2} \times 600$$

$$= \frac{34}{24} \times 600$$

$$= \frac{20.400}{24}$$

$$= 170.000.000$$

$$\text{anak PR} = \frac{17}{24} \times \frac{1}{2} \times 600$$

$$= \frac{34}{24} \times 600$$

$$= \frac{20.400}{24}$$

$$= 85.000.000$$

Figure 1. Stages of solving problems the subject of SA

At the re-examination stage, the subject can explain how to complete the completion steps first and the subject completes the known division and completes the children's division and the subject re-examines the questions and answers that have been written.

Maka

- Istri mendapatkan Rp. 75.000.000
- Ibu mendapatkan Rp. 100.000.000
- anak laki-laki I Rp. 170.000.000
- anak laki-laki II Rp. 170.000.000
- anak perempuan Rp. 85.000.000

Figure 2. Stages of re-examining the subject of SA

Subjects with moderate abilities have the initials DV. Subjects at the stage of understanding the problem; the subject understands the information contained in questions such as the wife gets $\frac{1}{8}$ share and the mother gets $\frac{1}{6}$ share and 2 sons get 2 parts and the daughter has 1 share and the subject can state the information asked, namely how much did the heirs get then the subject is able to understand problem solving.

At the planning stage, DV was able to relate what was known and asked because he saw the part and what was asked in the question, the subject was able to know that it was a matter of *faraidh* and fractions and was able to determine the design for the settlement of the distribution of inheritance such as the distribution of wives $\frac{1}{8}$ mother $\frac{1}{6}$ but for the division of children, the subject only wrote 2:2:1 and the subject did not write down the mathematical model of the settlement design so that the subject's answer to the division of children was still not correct, so the subject was not careful in designing the solution to the problem of dividing the inheritance.

At the problem-solving stage, DV is able to complete the steps that have been made as seen in the division of the subject can complete the multiplication of fractions so that the wife gets Rp. 75,000,000 the mother gets Rp. 100,000,000 but for the multiplication of children's fractions the subject is not correct and correct, where the subject only distributes the child's part with the amount of inheritance left, the student has not been able to answer the question correctly.

The image shows handwritten mathematical work on lined paper. It is divided into two columns. The left column contains calculations for 'Perempuan' (Woman) and 'Anak laki-laki 1' (Son 1). The right column contains calculations for 'Perempuan' (Woman) and 'Anak laki-laki 2' (Son 2). The calculations involve fractions and monetary values in Indonesian Rupiah (Rp.).

Category	Calculation	Result
Perempuan (Left)	$\frac{1}{8} \times 1.000.000.000$	$125.000.000$
Perempuan (Right)	$\frac{1}{6} \times 1.000.000.000$	$166.666.667$
Anak laki-laki 1 (Left)	$\frac{2}{3} \times 1.000.000.000$	$666.666.667$
Anak laki-laki 2 (Left)	$\frac{1}{3} \times 1.000.000.000$	$333.333.333$
Anak laki-laki 2 (Right)	$\frac{2}{3} \times 1.000.000.000$	$666.666.667$

Figure 3. Stages of solving problems the subject of DV

At the re-examination stage, the subject can explain how to complete the settlement steps first and the subject completes the known division and completes the division and the subject re-examines the questions and answers that have been written, the subject is able to re-examine the distribution of inheritance but students have not been able to complete the division inheritance.

The image shows a handwritten list of inheritance distribution results on lined paper. It starts with 'Dok. 151' and lists items with their corresponding monetary values in Indonesian Rupiah (Rp.).

Item	Value
Kek. Mendapatkan	$75.000.000$
Ibu Mendapatkan	$100.000.000$
Anak laki-laki 1	$200.000.000$
Anak laki-laki 2	$300.000.000$
Anak Perempuan	$100.000.000$

Figure 4. Stages of re-examining the subject of DV

Subjects with low ability, FA is at the stage of understanding the problem, the subject understands the information contained in questions such as the wife gets $\frac{1}{8}$ part

and the mother gets $1/6$ part and 2 boys get 2 parts and girls have 1 part and the subject can mentions the information asked, namely how much the heirs get, the subject is able to understand problem solving.

At the stage of designing the settlement, the FA is able to relate what is known and asked because it sees the part and what is asked in the question, the subject is able to know that it is a matter of *faraidh* and fractions and is able to determine the design for the settlement of the distribution of inheritance such as the division of wife $1/8$ Mother $1/6$ but for the division of children the subject only wrote 2:2:1 and the subject did not write down the mathematical model of the settlement design so that the subject's answer to the division of children was still not correct, the subject was not careful in designing the solution to the problem of dividing the inheritance.

At the stage of solving the problem, the FA has made steps to resolve it, but cannot correctly answer the division of inheritance as seen in the division of the subject, only writing the wife's share $1/8$ and the mother $1/6$ and the rest is the child's share, the subject cannot yet complete the distribution of inheritance

Penyelesaian

- Istri = $1/8 \times 600.000.000 = 75.000.000$
- Ibu = $1/6 \times 600.000.000 = 100.000.000$
- Selebihnya anak

Kesimpulan

Istri mendapatkan	Rp. 75.000.000	bayi-an
Ibu mendapatkan	Rp. 100.000.000	bayi-an

Figure 5. Stages of solving problems the subject of FA

In the re-checking stage, the FA subject re-examines the results of the answers that have been written.

Istri mendapatkan	Rp. 75.000.000	bayi-an
Ibu mendapatkan	Rp. 100.000.000	bayi-an

Figure 6. Stages of re-examining the subject of FA

From the results of the discussion above, the ability to solve mathematical problems is very important for *Faraidh* problems. This is also supported by the results of research which states that to be able to understand *Faraidh*, someone must understand Mathematics because it is a supporting factor in solving a *faraidh* problem (Kurniawan et al., 2022). The results of other studies using mathematical abilities in calculating *Faraidh* science is needed to minimize mistakes that occur that are not desired by everyone (Kamulia et al., 2022). Therefore, the problem-solving skills possessed by students are crucial things that must be continuously honed in order to be able to solve mathematical problems.

Conclusion

Problem solving ability is a process to find a combination of a number of rules that can be applied in an effort to overcome new situations. Subjects with high abilities have good problem solving skills on *faraidh* problems, as evidenced by all stages of problem solving that are met by highly skilled subjects starting from answering questions and interviews. Subjects with medium ability have sufficient problem-solving skills on the *faraidh* problem, it is proven that the subject is not right in solving problem solving and the subject is not right in explaining. Low-ability subjects have sufficient problem-solving skills on the *faraidh* problem, it is proven that the subject has not been able to explain problem solving.

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