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# Mathematical problem-solving: The impact of personality type on the system of linear equations in two variables

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## ABSTRACT

*This research aims to justify students' mathematical problem-solving abilities on the material of the System of Linear Equations in Two Variables in terms of the Hippocrates-Galenus personality type. This research method is included in qualitative descriptive research. The technique used is purposive sampling. The instruments in this research were personality-type questionnaires, mathematical problem-solving ability tests, and interviews. The triangulation technique was obtained by comparing the results of the student's problem-solving ability tests on the material of the System of Linear Equations in Two Variables with the results of the interviews. The results of this research are that the sanguine did not fulfill the aspect of re-examining all the stages that have been carried out, the choleric did not meet the problem-identifying aspect, the melancholy fulfilled the four aspects of mathematical problem-solving, and the phlegmatic did not meet two aspects, namely solving the problem according to the plan and re-examining all the stages that have been completed. Each student with each personality type according to Hippocrates-Galenus has different thoughts and steps to solve mathematical problems, therefore both educators and students who have different mindsets are expected to understand different thoughts.*

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## INTRODUCTION

Basically, every human being on earth is always faced with various kinds of problems that exist, both problems in everyday life and problems related to mathematics. One of the objectives of learning mathematics is problem-solving. According to the Regulation of the Minister of Education Number 22 of 2006 (Permendikbud, 2006), one of the skills

that students must have in studying mathematics is problem-solving ability (Herdiansyah & Purwanto, 2022). Mastery of concepts and principles of students who are not good can weaken the problem-solving ability of students (Zulkipli & Ansori, 2018). Ruseffendi (2018) argues that "Problem-solving skills are very important in mathematics, not only for those who will learn mathematics in the

future, but also for those who will apply it, both in other fields of study and in everyday life". So that the purpose of problem-solving is to create students' thinking processes so that they can apply them in everyday life.

Learning to solve problems trains students to monitor basic thinking, explore alternative ways, and examine possible solutions as a form of metacognition in problem-solving (Azhar et al., 2022). The ability of students to solve problems is supported by several factors, including those related to students' beliefs (Anggraini & Fauzan, 2020). Dahar (2018) stated that problem-solving is not a generic skill, but a human activity that combines previously acquired concepts and rules. This means that when someone can solve a problem, it means that person has got a new ability in one's life. It can be concluded that the more problems a person gets and succeeds in solving these problems, the more abilities they have. For students, when they are able to solve mathematical problems that exist in a material, their understanding of the material will be wider, and their abilities will be more and more.

There are four stages of mathematical problem-solving according to Polya, namely: (1) understand the problem (2) devise a plan (3) carry out the plan (4) look back (Soebagyo et al., 2021). The first stage is understanding the problem, this understanding aims so that students are able to develop a problem-solving plan well. Because if students at the beginning do not understand the concept of the existing problem, then the problem cannot be solved. The second stage is to devise a problem-solving plan based on the experience and knowledge of students in solving problems. The third stage can be carried out after the problem-solving plan is carried out, namely carrying out the problem-solving plan in accordance with the plan that has been made and then getting the results of

solving the problem. The fourth stage, which is looking back, can be interpreted as re-examining the results obtained by proving the truth of the answers obtained.

The material chosen by the researchers to justify the students' mathematical problem-solving in this research is the System of Linear Equations in Two Variables (SPLDV) because one of the mathematical concepts that are close to human activity is the System of Linear Equations in Two Variables (SPLDV). It is often used to interpret human activity in the form of several models of interconnected mathematical equations until a solution is obtained (Maarif et al., 2020). Through essay questions raised from everyday problems, it allows students to solve problems based on the knowledge they have or the experience they have gained. Therefore, students' mathematical problems can be solved in various ways or thoughts. However, in the material of the System of Linear Equations in Two Variables (SPLDV), there are difficulties in solving students' mathematical problems. There are several factors that make it difficult for students to solve mathematical problems, including (a) not mastering the material, making it difficult for students to solve the problems specified; (b) mathematical concepts that are not understood by students; (c) the inability of students to integrate the relationship between mathematics and other sciences; (d) lack of application of mathematical concepts in daily life (Hastuti et al., 2021). In addition, in the System of Linear Equations in Two Variables (SPLDV) sub-material, there are three methods that can be used to solve problems related to the System of Linear Equations in Two Variables (SPLDV), namely the substitution method, the elimination method, and the graph (Istinganah, 2019).

Each student must have a different attitude, way of thinking, and experience in solving a problem, one of the things that

influence it is the type of personality. Personality shows someone who stands alone and apart from other individuals, usually always associated with patterns of human behavior related to norms about good and bad things (Mayasari et al., 2019). Meanwhile, according to Allport (Riawan et al., 2020) personality is an organizational unit that is dynamic in nature from an individual's psychophysical system that determines one's unique adaptability to the environment. Psychology has developed various personality theories that have been advocated by experts. Personality itself refers to patterns of thought, emotion, social adaptation, and consistent behavior that have a significant impact on a person's expectations, self-awareness, values, and attitudes (Azizah, 2021). It can be concluded that personality is the identical characteristics possessed by every human being. In this research, the personality type theory that the

researcher chose was the Hippocrates-Galenus personality type. Because these personality types are quite widely used as research material, making it easier for researchers to find references.

Hippocrates argued that within a person there are four dominant fluids related to the four basic elements, including a) Dry nature, contained in chole (choleric), namely yellow bile; b) Wet nature, contained in melancholy, namely black bile; c) Cold nature, contained in phlegm (phlegmatic), namely lenders; d) The nature of heat, contained in sanguine, namely blood (Pamungkas & Siswanto, 2021). After Hippocrates argued that statement, Galenus perfected it by saying that if in the human body there is a dominant fluid (excess fluid), typical psychological traits (personality) will arise, where at this time personality is defined as temperament (Azis, 2018). The description of the four personality types with distinctive traits is listed in Table 1.

**Table 1.** Melancholic, Sanguine, Choleric, and Phlegmatic Personality Theories and Their Traits

Personality	Traits
Melancholic	Lack of confidence, sad, gloomy, and pessimistic Other traits: careful, consistent, depressed by the past, difficult to adjust, and likes to keep promises
Sanguine	Optimistic, cheerful, and confident Other traits: adaptable, kind, unstable, not serious, less trustworthy, and less consistent
Choleric	Act negatively and aggressively, not satisfied Other Traits: emotional, provocation, selfish, impatient, intolerant, and lack of humor
Phlegmatic	Calm, neutral, stable, and quiet Other traits: feeling quite satisfied, indifferent, not easily moved, slow, very frugal, orderly, and passive

Based on research conducted by Saleh et al. (2020) in their article entitled "Analisis Kemampuan Pemecahan Masalah Matematis Sebagai Dampak Pembelajaran Sinektik dan Tipe Kepribadian" contained in "EduSains: Jurnal Pendidikan Sains dan Matematika" concluded that there was an interaction between Synectic learning models and personality types on mathematical problem-solving abilities. However, there

was no influence between students and personality types (choleric, phlegmatic, melancholic, and sanguine) on mathematical problem-solving abilities.

Another research entitled "Kemampuan Pemecahan Masalah Matematis Siswa SMP Pada Materi SPLDV Ditinjau Dari Kemampuan Awal Matematika" by Purnamasari & Setiawan (2019) showed that of the 5 questions given, question number 5 was included in

the questions that were difficult for students to solve. Then the upper KAM group has mathematical problem-solving abilities at the stage of understanding the problem, formulating strategies, and solving problem-solving strategies that are better than students in the middle KAM group and the lower KAM group. However, all students in the upper KAM, middle KAM, and lower KAM did not master the 4th indicator, namely re-examining the correctness of the answers.

Suraji et al. (2018) in the research entitled "Analisis Kemampuan Pemahaman Konsep Matematis dan Kemampuan Pemecahan Masalah Matematis Siswa SMP Pada Materi Sistem Persamaan Linear Dua Variabel (SPLDV)" suggested that based on the data obtained according to the questions done by students, it appears that the error of each indicator of concept understanding and students' mathematical problem-solving is classified as very low and from the results of data analysis in the journal, it is also obtained that the high ability of students to understand mathematical concepts is related to the high ability of students to solve mathematical problems, thus getting a conclusion that there is a relationship between the two abilities.

Relevant research entitled "Analisis Metakognisi Siswa Dalam Memecahkan Masalah Matematika Ditinjau Dari Tipe Kepribadian Hipocrates" by Mayasari et al. (2019) through the "Jurnal Kajian Pembelajaran Matematika" resulted in a conclusion that the choleric, sanguine, phlegmatic, and melancholic personality types have different metacognitions in solving mathematical problems.

Based on the four studies that have been carried out and the things that have been explained, the researcher wants to justify and combine students' mathematical problem solving with the material of the System of Linear Equations

in Two Variables (SPLDV) through the Hippocrates-Galenus personality type, namely sanguine, choleric, melancholic, and phlegmatic.

## METHOD

The method used in this research is a qualitative approach with a descriptive type of research that aims to analyze the mathematical problem-solving abilities of students in class VIII SMPN 50 Bekasi City in terms of personality types according to Hippocrates-Galenus. The research instrument used consisted of a questionnaire, a mathematical problem-solving test, and a validated interview test. The research flowchart is shown in Figure 1.

The questionnaire was distributed online by the researcher via WhatsApp Group to determine at least two students each of each personality type, namely sanguine, choleric, melancholic, and phlegmatic, which were then continued as research subjects. The test method used was the System of Linear Equations Two Variables (SPLDV) question, which consists of 3 questions in the form of a description based on the level of difficulty of the questions to explore students' understanding of solving mathematical problems based on the Polya stages seen from each personality type. The question grid made by the researcher was adopted from Ismawati (2016) and can be seen in Table 2.

The interview method chosen by the researcher is semi-structured, where in practice the researcher is freer to ask questions that have been designed to get more accurate information about solving mathematical problems for students of each personality type.

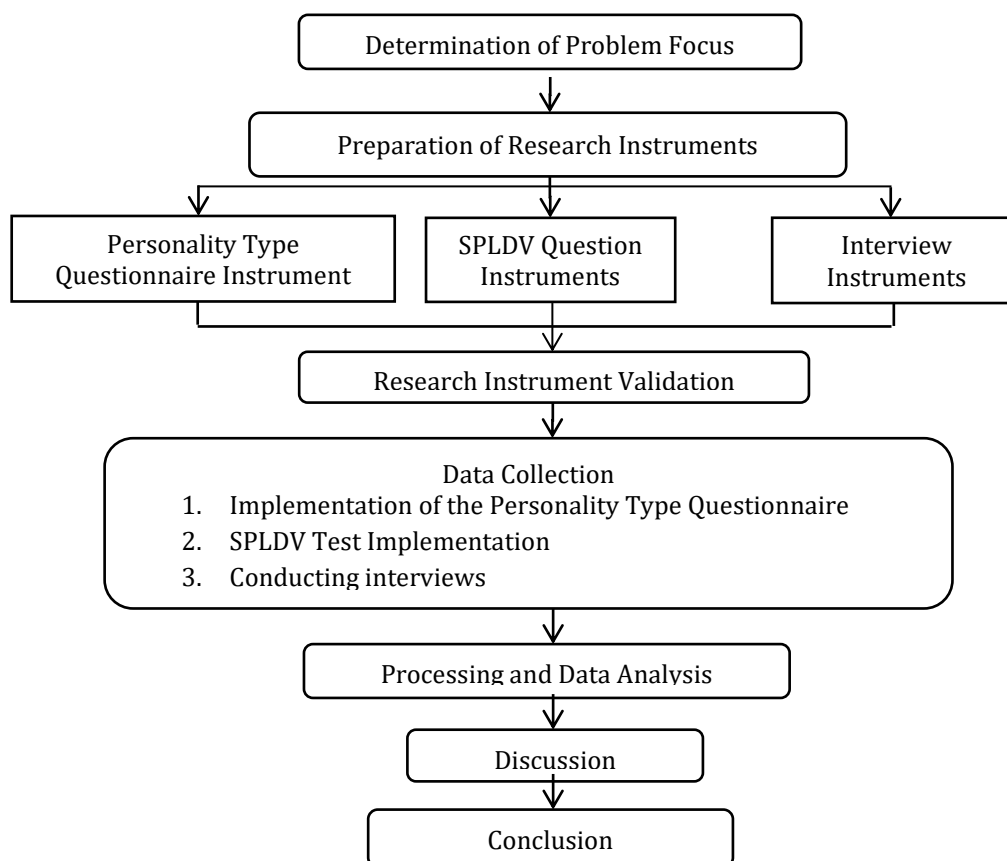


Figure 1. Research Flowchart

The data analysis technique in this research used the Miles and Huberman model, namely data reduction, data presentation, and drawing conclusions. The validity or accuracy of the data is obtained by the triangulation technique. The triangulation used is technical triangulation. This triangulation tests credibility by checking the data to the same source with different techniques. This research compares the results of the mathematical problem-solving ability test with the results of interview tests from each research subject. After that, the researchers discussed to make sure which ones were considered true or maybe all of them were true because they were based on different points of view (Pratiwi, 2017).

## RESULTS AND DISCUSSION

The personality type questionnaire was given online via Google Form to 28 students in class VIII SMPN 50 Bekasi City.

Based on the highest score from each student, the researcher categorizes the students into personality types according to Hippocrates-Galenus and it is found that 6 students are Sanguine type, 3 students are Choleric type, 9 students are Melancholic type, and 10 students are Phlegmatic type. Then the researcher chose 4 students as research subjects consisting of 1 student with sanguine type, 1 student with choleric type, 1 student with melancholic type, and 1 student with phlegmatic type. The researcher gave 3 questions related to solving mathematical problems on the material of the System of Linear Equations in Two Variables based on the level of difficulty and indicators that had been determined for the 4 research subjects. The research data are written test results data and interview data. Table 3 is the results of the research of the four research subjects.

**Table 2.** The System of Linear Equations in Two Variables Problem Grid

Core Competencies	Basic Competencies	Question Indicator	Difficulty Level	Question Criteria
Processing, presenting, and reasoning in the concrete realm (using, parsing, assembling, modifying, and creating) and abstract realms (writing, reading, counting, drawing, and composing) according to what is learned in school and other sources from the same point of view/theory	Create and solve mathematical models of real problems related to linear equations in two variables	Given a problem related to SPLDV regarding the price of purchasing 2 types of goods, students can determine the price of each item	Easy	The two equations are clearly implied
		Given the SPLDV problem related to information from 2 objects, students can determine the number of each object	Medium	Other knowledge is needed beyond what is known in the problem to determine other equations (besides the equations that are clearly implied)
		Given the SPLDV problem related to the age information of 2 people at different time periods, students can determine the age of each person	Hard	Other knowledge is needed beyond what is known in the problem and processing of that knowledge is needed to be able to determine an equation

**Table 3.** Research Subject Category

Subject	Name	Score	Personality Type			
			Sanguine	Choleric	Melancholy	Phlegmatic
1.	SYM	19	✓			
2.	NIA	13		✓		
3.	HJPH	16			✓	
4.	AOS	14				✓

Question number 1 is a mathematical problem-solving ability test given to students as follows: "Dinda and Selly go shopping at Alfamart Suka Jaya. Dinda paid Rp. 12,500.00 to buy 3 boxes of milk and 2 packs of chips. Selly had to pay Rp. 20,500.00 to buy 5 boxes of milk and 3 packs of chips. How much do 1 box of milk and 1 chip cost?". From these questions, the results of the S1 written test are presented in Figure 1.

misalnya susu kotak :  $x$   
 keripik =  $y$   
  $3x + 2y = 12500$  ( $\times 5$ )  $15x + 10y = 62500$   
  $5x + 3y = 20500$  ( $\times 3$ )  $15x + 9y = 61500$   
  $y = 1000$   
 jadi harga 1 bungkus keripik adalah Rp. 1000.00

**Figure 2.** Answer to Question Number 1 by S1



obtained and only wrote the conclusions obtained at the stage of problem-solving.

Based on the interview excerpt of question number 1 by S3, the subject understands the elements needed for problem recognition, and S3 can also prove the answers obtained by substituting each value obtained into each equation, so it can be concluded that S3 fulfills the four stages of problem-solving mathematical. Furthermore, the results of the written test of question number 1 by S4 are in Figure 5.

$3x + 5y = \text{Rp. } 125.000$      $\times 3$      $9x + 15y = 375.000$   
 $5x + 3y = \text{Rp. } 20.500$      $\times 5$      $25x + 15y = 102.500$   
 $-x = -3500$   
 $x = 3500$   
 Harga susu ←  $K : 3500$   
 per liter total

Figure 5. Answer to Question Number 1 by S4

The results of the written answer S4 on question number 1 show that S4 did not write down the stage of understanding the problem, where in the question what elements were known and asked. At the stage of the arrangement of the design to get the desired result is correct. However, at the stage of solving the problem, it is not in accordance with the design, the subject only writes one of the results of the solution, while in this problem two solutions must be obtained. And S4 also did not write down the stage of re-examining the results obtained and drawing conclusions.

Based on the interview excerpt of question number 1 by S4, the subject can mention the elements that are known and asked, but at the stage of solving the problem according to the design made by S4, S4 can only work on one of the elements asked.

Question number 2 is a mathematical problem-solving ability test given to students as follows "In a parking lot there are 92 vehicles consisting of motorbikes and cars. After counting the

total number of wheels there are 260 pieces. How many motorcycles and cars each are in the parking lot?". From these questions, the results of the S1 written test of question number 2 are presented in Figure 6.

diket: motor =  $a$ , mobil =  $b$      $a + b = 92$   
 roda motor =  $2a$ , roda mobil =  $4a$      $2(a + b) + 4b = 260$   
 dicari: banyak motor & mobil.     $18a - 2b + 4b = 260$   
 $2b = 260 - 18a$      $2b = 76$   
 $b = 38$   
 $a = 92 - b$   
 $a = 92 - 38$   
 $a = 54$   
 nilai yg di peroleh:  $a = 54$      $b = 38$   
 masing-masing: motor =  $b : 38$   
 mobil =  $a : 54$

Figure 6. Answer to Question Number 2 by S1

The results of the written answer S1 for question number 2 indicate that the subject has written down three stages of solving mathematical problems correctly, namely the stage of understanding the problem, the stage of planning problem-solving, and the stage of solving the problem according to the design. However, the subject did not write down the stage of re-examining the results obtained and only wrote the conclusions obtained at the stage of problem-solving.

Based on the interview excerpt of question number 2 by S1, the subject can meet the elements that are known and asked, and it is proven that S1 cannot prove the answers obtained and only draw conclusions from the completion stage. Furthermore, the results of the written test of question number 2 by S2 are in Figure 7.



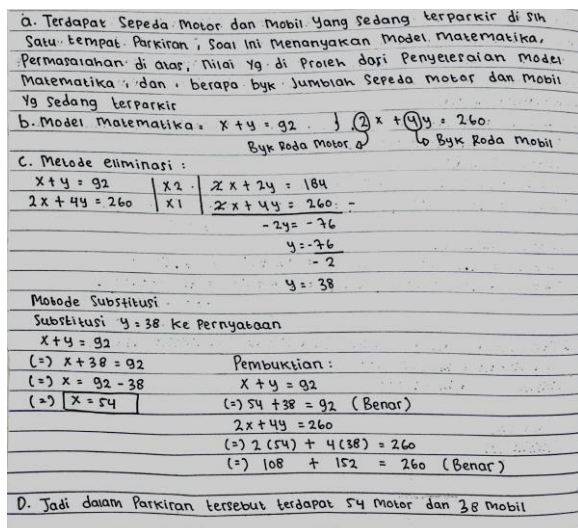


Figure 7. Answer to Question Number 2 by S2

The results of the written answer S2 for question number 2 indicate that the elements needed at the stage of understanding the problem are not yet precise about what is known. As for the stage of planning problem-solving, the stage of solving the problem according to the design, and the stage of proving back and drawing conclusions, the written answer from S2 is correct.

Based on the interview excerpt of question number 2 by S2, it is proved that the subject did not understand the elements that are known at the stage of understanding the problem, but the results of the completion that S2 gets along with the proof of these results are correct. Furthermore, the results of the written test of question number 2 by S3 are in Figure 8.

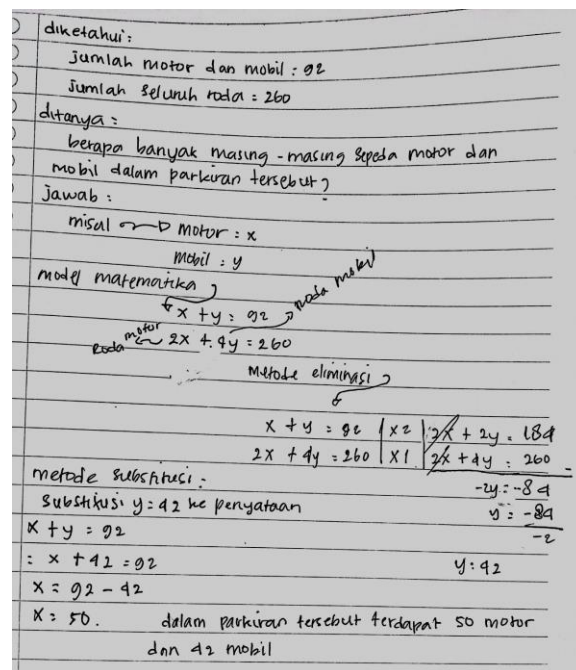


Figure 8. Answer to Question Number 2 by S3

The results of the written answer S3 for question number 2 indicate that the elements needed at the problem understanding stage and the problem-solving design stage are correct, but the results obtained at the problem-solving stage based on the problem-solving design are less appropriate. This affects the stage of proving the answer and drawing conclusions written by S3 which are not quite right.

Based on the interview excerpt of question number 2 by S3, it is proven that the subject basically understands the stages of problem-solving, but the results obtained are not quite right because there are errors when working. After being repaired and re-proven the results of the revision that S3 got, the subject was declared capable of fulfilling the problem-solving stage and proving the solution obtained. Furthermore, the results of the written test of question number 2 by S4 are in Figure 9.

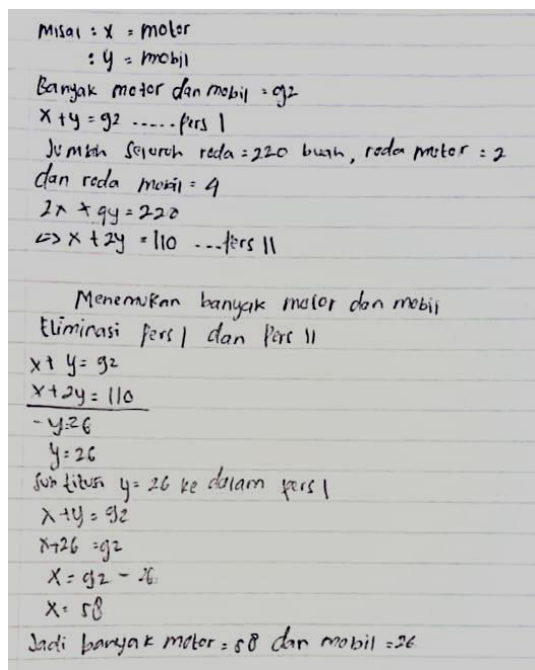


Figure 9. Answer to Question Number 2 by S4

The results of the written answer S4 for question number 2 show that the elements needed at the problem understanding stage and the problem-solving design stage are correct, but the results obtained at the problem-solving stage based on the problem-solving design are less appropriate. This has an effect on the stage of proving the answer and drawing conclusions written by S4 which are not quite right.

Based on the interview excerpt of question number 2 by S4, the subject understands the elements needed at the stage of understanding the problem, but there is an error in writing numbers in the planning stage of completion that affects the problem-solving process that is less appropriate. After being revised, the results obtained are appropriate, but S4 did not carry out the stage of re-examining the answers obtained.

Question number 3 is a mathematical problem-solving ability test given to students as follows "Three years ago the age of the father was 6 times the age of his son, in the next 21 years the age of the father will be 2 times the age of his son. How old are the father and son now?"

From these questions, the results of the S1 written test are presented in Figure 10.

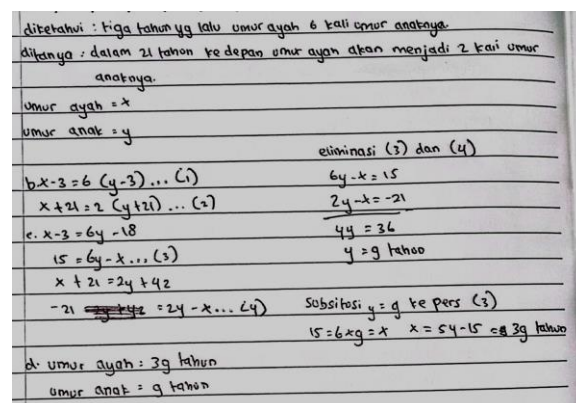


Figure 10. Answer to Question Number 3 by S1

The results of the written answer S1 for question number 3 indicate that the elements needed at the stage of understanding the problem are not correct regarding what the question is asking. As for the problem-solving design stage and the problem-solving stage, it is appropriate in accordance with the written answer design from S1. However, at the stage of re-examining the answers that have been obtained, S1 did not write down the written answers.

Based on the interview excerpt of question number 3 by S1, the subject can fully mention the elements that are known and asked in the question and it is proven that S1 cannot prove the answers obtained and only draw conclusions from the completion stage. Furthermore, the results of the written test for question number 3 by S2 are in Figure 11.

a. Seorang ayah dan anak yang memiliki jarak umur yg cukup jauh. Soal ini menanyakan tentang Model Matematika, Nilai yg di peroleh dari Penyelesaian Model Matematika tersebut, dan, berapa umur ayah dan anak sekarang

b.  $x(3) = 6(y(3))$  Di kurung 3, karena 3 tahun yg lalu

$x(21) = 2(y(21))$  Di Lambang 21, karena 21 kemudian

Tiga tahun lalu	Pembuktian:
$x-3 = 6(y-3)$	$x-3 = 6(y-3)$
$(\Rightarrow) x-3 = 6y-18$	$(\Rightarrow) 99-3 = 6(19-3)$
$(\Rightarrow) x-6y = -18+3$	$(\Rightarrow) 96 = 6(16)$
$(\Rightarrow) x-6y = -15$ (Persamaan 1)	$(\Rightarrow) 96 = 96$ (Benar)
21 tahun Mendatang:	$x+21 = 3(y+21)$
$x+21 = 3(y+21)$	$(\Rightarrow) 99+21 = 3(19+21)$
$(\Rightarrow) x+21 = 3y+63$	$(\Rightarrow) 120 = 3(40)$
$(\Rightarrow) x-3y = 63-21$	$(\Rightarrow) 120 = 120$ (Benar)
$(\Rightarrow) x-3y = 42$ (Persamaan 2)	

D. Jadi jumlah umur ayah skrg adalah skrg adalah 99 tahun dan umur anak 19 tahun

Metode Eliminasi

$$\begin{array}{r} x-6y = -15 \\ x-3y = 42 \quad - \\ \hline -3y = -57 \\ y = -57 \div -3 \\ y = 19 \end{array}$$

Metode Substitusi: Substitusi  $y = 19$  ke Persamaan

$$\begin{array}{l} x-6y = -15 \\ (\Rightarrow) x-6(19) = -15 \\ (\Rightarrow) x-114 = -15 \\ (\Rightarrow) x = -15 + 114 \quad (\Rightarrow) x = 99 \end{array}$$

Figure 11. Answer to Question Number 3 by S2

The results of the written answer S2 for question number 3 indicate that the elements needed at the stage of understanding the problem are not yet appropriate about what is known. As for the problem-solving design stage shown the answer is correct. However, at the stage of problem-solving according to the design, it is not quite right. So, the results obtained along with the conclusions are also inaccurate.

Based on the interview excerpt of question number 3 by S2, the subject still did not understand the elements needed at the problem recognition stage, namely what is known and asked in the question. S2 basically understands the stages of problem-solving, but the results obtained are less appropriate because there are errors when working. After being revised and re-proven to ensure the answer at the last stage, S2 has done it correctly. Furthermore, the results of the written test for question number 3 by S3 are in Figure 12.

diketahui:

- 3 Tahun lalu umur ayah 6 kali umur anaknya
- 21 Tahun kedepan umur ayah akan menjadi 2 kali umur anaknya

ditanya:

- berapa umur ayah dan anak sekarang

Jawab:

misal umur ayah sekarang =  $x$   
umur anak sekarang =  $y$

Model matematika:

$$\begin{array}{l} x-3 = 6(y-3) \\ x+21 = 2(y+21) \end{array}$$

tiga tahun lalu

$$\begin{array}{l} x-3 = 6(y-2) \\ = x-3 = 6y-18 \\ x-6y = -18+2 \\ x-6y = -16 \quad (\text{Persamaan 1}) \end{array}$$

21 tahun kedepan:

$$\begin{array}{l} x+21 = 2(y+21) \\ = x+21 = 2y+42 \\ x-2y = 42-21 \\ x-2y = 21 \quad (\text{Persamaan 2}) \end{array}$$

metode eliminasi

$$\begin{array}{r} x-6y = -16 \\ x-2y = 21 \quad - \\ \hline -4y = -37 \\ y = -37 \div -4 \\ y = 9 \end{array}$$

metode substitusi:

substitusi  $y = 9$  ke persamaan  $x-6y = -16$

$$\begin{array}{l} x-6(9) = -16 \\ x-54 = -16 \\ x = -16 + 54 \\ x = 38 \end{array}$$

Figure 12. Answer to Question Number 3 by S3

The results of the written answer S3 for question number 3 indicate that the elements needed at the problem-solving stage have been met, but at the problem-solving design stage they are not quite right. This affects the results of solving problems that are less appropriate. S3 also did not re-examine the correctness of the answer.

Based on the interview excerpt of question number 3 by S3, it is evident that there was a calculation error at the stage of mathematical modeling or problem-solving design, resulting in inaccurate results. After getting the correct results and proof, the subject is considered capable of fulfilling the four elements of mathematical problem-solving.

Furthermore, the results of the third question written test by S4 are in Figure 13.

$x = \text{umur ayah saat ini}$   
 $y = \text{umur adik saat ini}$   
 $(x-2) = 6(y-2)$   
 $x - 6y = -10 \dots (1)$   
 $x - 6y = 10$   
 $x - 2y = 21$   
 $-4y = -28$   
 $y = 7$  umur adik saat ini  
 $x - 2(7) = 21$   
 $x - 14 = 21$   
 $x = 35$  umur ayah saat ini  
 $x = 32$  dan  $y = 39$

**Figure 13.** Answer to Question Number 3 by S4

The results of the written answer S4 for question number 3 show that S4 did not write down the stage of understanding the problem, where in the question what elements were known and asked were

needed. The problem-solving design stage is also not appropriate. This affects the problem-solving stage and the proof stage, the results obtained are not correct and there is no proof of answers along to drawing conclusions.

Based on the interview excerpt of question number 3 by S4, it is proven that the subject actually understands the elements contained at the stage of understanding the problem, but there were errors in writing numbers at the mathematical modeling stage which affects the problem-solving process that is less appropriate. After improving the results, the subject was unable to prove the answers obtained. Triangulation of data from the results of the problem-solving ability test is shown in Table 4.

**Table 4.** Data Triangulation Results

Subject	Name	Identifying Problems	Personality Type Indicator		
			Planning Troubleshooting	Problem-solving	Rechecking All Stages
S1	Sanguine	✓	✓	✓	×
S2	Choleric	×	✓	✓	✓
S3	Melancholy	✓	✓	✓	✓
S4	Phlegmatic	✓	✓	×	×

The results of triangulation of data in this research indicate the suitability of the relevant article entitled "Analisis Metakognisi Siswa Dalam Memecahkan Masalah Matematika Ditinjau Dari Tipe Kepribadian Hipocrates" by Mayasari et al. (2019) and another article entitled "Kemampuan Pemecahan Masalah Matematis Siswa SMP Pada Materi SPLDV Ditinjau Dari Kemampuan Awal Matematika" by Purnamasari & Setiawan (2019) that the mathematical problem-solving ability performed by each student with a different personality type has clear different results in working on the problems in the System of Linear Equations in Two Variables (SPLDV) material given.

## CONCLUSIONS AND SUGGESTIONS

Based on the results of the research and data analysis above, students with the sanguine type only aspects of re-examining all the stages that have been carried out that have not been fulfilled, and students with the choleric type only aspects of identifying problems that are not met, students with the melancholic type fulfill the four aspects of mathematical problem-solving, and students with the phlegmatic type do not fulfill two aspects, namely solving problems according to the plan and re-examining all the stages that have been carried out.

Further researchers, it is expected to be able to further analyze some elements in solving mathematical problems of

students who are still not understood step by step. It is expected for teachers to be able to provide more varied questions in terms of the System of Linear Equations in Two Variables or other materials by applying mathematical problem-solving steps. In addition, each student certainly has a different personality type and different steps for solving mathematical problems, it would be better if every educator could understand the mindset in solving these mathematical problems.

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#### REFERENCES

- Anggraini, R. S., & Fauzan, A. (2020). The effect of realistic mathematics education approach on mathematical problem solving ability. *Edumatika: Jurnal Riset Pendidikan Matematika*, 3(2).  
<https://doi.org/10.32939/ejrpm.v3i2.595>
- Azhar, E., Purwanto, S. E., & Laili, N. (2022). Bagaimana siswa memecahkan masalah aritmatika sosial berdasarkan tingkat kemampuan matematis siswa. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 11(1), 370-383.
- Azis, N. A. (2018). Profil keterampilan berpikir kreatif siswa dalam memecahkan masalah matematika ditinjau dari kepribadian. *MATEMATIKA DAN PEMBELAJARAN*, 6(2).  
<https://doi.org/10.33477/mp.v6i2.66>
- Azizah, N. D. (2021). Hubungan tipe kepribadian hippocrates-galenus dengan tingkat kesabaran mahasiswa dalam sistem kuliah online. *Jurnal Perspektif*, 5(1).
- Hastuti, E. S., Umam, K., Eclarin, L., & Perbowo, K. S. (2021). Kecemasan siswa sekolah menengah pertama dalam menyelesaikan masalah spldv pada kelas virtual. *International Journal of Progressive Mathematics Education*, 1(1).  
<https://doi.org/10.22236/ijopme.v1i1.6914>
- Herdiansyah, F., & Purwanto, S. E. (2022). Pengaruh pembelajaran matematika realistik (PMR) terhadap kemampuan pemecahan masalah matematis siswa kelas II pada materi operasi hitung penjumlahan dan pengurangan. *Jurnal Basicedu: Journal of Elementary Education*, 6(4).
- Hidayat, W., & Sariningsih, R. (2018). Kemampuan pemecahan masalah matematis dan adversity quotient siswa smp melalui pembelajaran open ended. *JNPM (Jurnal Nasional Pendidikan Matematika)*, 2(1).  
<https://doi.org/10.33603/jnpm.v2i1.1027>
- Islamiah, N., Purwaningsih, W. E., Akbar, P., & Bernard, M. (2018). Analisis hubungan kemampuan pemecahan masalah matematis dan self confidence siswa smp. *Journal On Education*, 1(1).
- Ismawati, Y. (2016). Analisis kemampuan pemecahan masalah spldv siswa berkemampuan tinggi di kelas viii smp kristen satya wacana berdasarkan tahapan polya ditinjau dari tingkat kesukaran soal.  
<http://repository.uksw.edu/handle/123456789/9805>
- Istinganah, L. (2019). Analisis kemampuan pemecahan masalah matematika siswa kelas viii menggunakan alternative solution worksheet dengan scaffolding.
- Maarif, S., Setiarini, R. N., & Nurafni, N. (2020). Hambatan epistemologis siswa dalam menyelesaikan masalah sistem persamaan linear dua variabel. *Jurnal Didaktik Matematika*, 7(1).

- <https://doi.org/10.24815/jdm.v7i1.15234>
- Mayasari, D., Utomo, D. P., & Cholily, Y. M. (2019). Analisis metakognisi siswa dalam memecahkan masalah matematika ditinjau dari tipe kepribadian hipocrates. *Jurnal Kajian Pembelajaran Matematika*, 3(1).
- Pamungkas, D. Y., & Siswanto, R. D. (2021). Identifikasi pemecahan masalah matematis peserta didik berdasarkan tipe kepribadian hippocrates-galenus dan gender. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, 5(3). <https://doi.org/10.31004/cendekia.v5i3.789>
- Permendikbud. (2006). *Peraturan menteri pendidikan dan kebudayaan RI nomor 22 tahun 2006 tentang standar proses pendidikan dasar dan menengah*.
- Pratiwi, N. I. (2017). Penggunaan media video call dalam teknologi komunikasi. *Jurnal Ilmiah DInamika Sosial*, 1.
- Purnamasari, I., & Setiawan, W. (2019). Analisis kemampuan pemecahan masalah matematis siswa smp pada materi SPLDV ditinjau dari kemampuan awal matematika. *Journal of Medives: Journal of Mathematics Education IKIP Veteran Semarang*, 3(2). <https://doi.org/10.31331/medivesveteran.v3i2.771>
- Riawan, I., Sujiran, & Puspananda, D. R. (2020). Analisis kemampuan pemecahan masalah matematika pada materi aritmatika sosial ditinjau dari tipe kepribadian siswa. *Educatif Journal of Education ...*, 2(20).
- Saleh, C., Negara, H. S., & Istihana, I. (2020). Analisis kemampuan pemecahan masalah matematis sebagai dampak pembelajaran sinektik dan tipe kepribadian. *Edu Sains Jurnal Pendidikan Sains & Matematika*, 8(1). <https://doi.org/10.23971/eds.v8i1.1757>
- Soebagyo, J., Habibie, H., & Gunawan, I. (2021). Polya's four phases exploration in solving linear program story questions based on student beliefs. *Proceedings of the 1st Annual International Conference on Natural and Social Science Education (ICNSSE 2020)*, 547. <https://doi.org/10.2991/assehr.k.210430.040>
- Suraji, S., Maimunah, M., & Saragih, S. (2018). Analisis kemampuan pemahaman konsep matematis dan kemampuan pemecahan masalah matematis siswa SMP pada materi sistem persamaan linear dua variabel (SPLDV). *Suska Journal of Mathematics Education*, 4(1). <https://doi.org/10.24014/sjme.v4i1.5057>