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DESCRIPTION OF STUDENTS' FRACTION PROBLEM-SOLVING ABILITY BASED ON KEIRSEY'S PERSONALITY TYPE CLASS VII SMP NEGERI 18 SELAYAR

Ahmad Talib[1)*], Rosidah[2)], Asmaun[3)], Rismayanti[4)], Sri Yuyun[5)]
[1,2,3,4,5]Department of Mathematics Education, Universitas Negeri Makassar
[1,2,3,4,5]Jl. Daeng Tata Raya, Parang Tambung, Makassar, Indonesia
Email: ahmadtalibunm@gmail.com[1)*], rosidah@unm.com[2)], asmaun@unm.ac.id.com[3)], rismayantihr5@gmail.com[4)], sriyuyun814@gmail.com[5)]

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Abstract:
This research aims to describe the problem-solving ability of fractional counting operations in terms of Keirsey's personality type. The type of research is qualitative research with a descriptive approach. The research subjects were 4 students from class VII A of SMPN 18 Selayar with 1 subject for each personality type. The research instruments used personality type classification instruments, problem-solving tests, and interview guides. The results of the research show that 1) Students with the guardian personality type are able to understand the problem, make a solution plan, carry out the solution plan, and check again, 2) Students with the artisan personality type are able to understand the problem, make a solution plan for problem 1 but are unable to solve problem 2, unable to carry out the solution plan and unable to check again, 3) Students with the rational personality type are able to understand the problem, make a solution plan for problem 1 but are unable to solve problem 2, carry out the solution plan, and check again, 4)) Students with the idealist personality type are able to understand the problem, make a plan to solve problem 1 but are not able to solve problem 2, and also unable carry out the solution plan, as well as to check again.

Keywords: Problem-Solving Ability, Fractional Numbers, Personality Type

DESKRIPSI KEMAMPUAN PEMECAHAN MASALAH PECAHAN SISWA DITINJAU DARI TIPE KEPRIBADIAN KEIRSEY KELAS VII SMP NEGERI 18 SELAYAR

Abstrak:
Penelitian ini bertujuan untuk mendeskripsikan kemampuan pemecahan masalah operasi hitung bilangan pecahan ditinjau dari tipe kepribadian Keirsey. Jenis penelitian ini adalah penelitian kualitatif dengan pendekatan deskriptif. Subjek penelitian sebanyak 4 siswa dari kelas VII A SMPN 18 Selayar dengan 1 subjek untuk masing-masing tipe kepribadian. Instrumen penelitian menggunakan instrumen penggolongan tipe kepribadian, tes pemecahan masalah, dan pedoman wawancara. Hasil penelitian menunjukkan bahwa 1) Siswa tipe kepribadian guardian mampu memahami masalah, mampu membuat rencana penyelesaian, mampu melaksanakan rencana penyelesaian dan mampu memeriksa kembali, 2) Siswa tipe kepribadian

artisan mampu memahami masalah, mampu membuat rencana penyelesaian soal 1 namun tidak mampu pada soal 2, tidak mampu melaksanakan rencana penyelesaian dan tidak mampu memeriksa kembali, 3) Siswa tipe kepribadian rasional mampu memahami masalah, mampu membuat rencana penyelesaian soal 1 namun tidak mampu pada soal 2, mampu melaksanakan rencana penyelesaian, dan mampu memeriksa kembali, 4) Siswa tipe kepribadian idealis mampu memahami masalah, mampu membuat rencana penyelesaian soal 1 namun tidak mampu pada soal 2, tidak mampu melaksanakan rencana penyelesaian, dan tidak mampu memeriksa kembali.

Kata Kunci: Kemampuan Pemecahan Masalah, Bilangan Pecahan, Tipe Kepribadian

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INTRODUCTION

Problem-solving is a very important part of the mathematics curriculum. This is because students will gain experience in using their knowledge and skills to solve problems. One of the goals of learning mathematics in schools is for students to have the ability to solve everyday problems (Rosyada & Wibowo, 2023). Problem-solving skills are very important in mathematics because problem-solving skills can help students think analytically in making decisions in everyday life and help improve critical thinking skills in dealing with new situations (Badriah, Mahanal, & Lukiati, 2023). Mathematical problem-solving skills are a person's ability to solve mathematical problems by using known elements to determine the formula used as a solution strategy (Safstrom, Lithner, Palm, Palmberg, Sidenvall, Andersson, Bostrom, & Granberg 2024).

Several studies have shown the low mathematical problem-solving ability of students in Indonesia. Permata, Sunandar, and Endahwuri (2020) stated that students in Indonesia tend to have difficulty when facing mathematical problems. The difficulty that occurs is when students have difficulty translating the given problem into a mathematical sentence. Fitriyah (2016) stated that the weaknesses of students found in problem-solving are the lack of students ability to understand the meaning of the question, paying less attention to the process of working on the question, and the lack of evaluation in concluding. Then the results of the three-yearly survey of the Program for International Student Assessment (PISA) coordinated by the Organization for

Economic Cooperation and Development (OECD) revealed that revealed that the results of PISA Indonesia 2022 showed a decrease in learning outcomes internationally due to the pandemic (OECD, 2022).

One of the essential problems often found in the environment around students is fractions. Based on the results of observations and interviews with researchers at SMP Negeri 18 Selayar, it was previously obtained information that there are still many students who have difficulty solving fractional arithmetic operations. Students only rely on what is explained by the teacher and the notes given, students when given practice questions that are slightly different from the example questions that have been explained, students experience difficulties or students will start to get confused and tend not to understand the solution to the problem. In addition, students are also less careful in answering questions and some students still rely on answers from their friends.

Differences in students' abilities in solving mathematical problems can also be caused by differences in characteristics possessed by each individual. One of these characteristics is personality type. Siskawati, Zaenuri, Dwidayanti, and Junaedi (2021) said that the ability to solve mathematical problems will be different if the personality of a person is also different. Muktamar, Ramadani, Ahmad, and Ardi (2023) define personality type as a description of how a person takes information and how a person makes decisions. Understanding information, decision-making, and problem-solving are interrelated cognitive processes.

Realizing the importance of solving mathematical problems in the world of mathematics education with a person's personality, this study will describe the problem-solving ability reviewed from the type of student personality so that the results of this description can be a reference for teachers in providing quality learning that is following the type of student personality. The personality type used refers to the personality type according to Keirsey (1998), namely guardian, artisan, rational, and idealist. The Keirsey personality type is a personality type that classifies the personality based on the pattern of behavior that appears but is more about the way a person thinks. The tendency to think based on this personality type which the researcher will later associate with students' problem-solving skills.

The problem-solving ability of fractional operations of each personality needs to be described clearly so that students and teachers can minimize similar errors and improve problem-solving abilities and learning outcomes.

Therefore, this study aims to describe the problem-solving ability of fractional operations reviewed from the Keirsey personality type of class VII SMP Negeri 18 Selayar.

METHODS

The type of research is qualitative research with a descriptive approach. This study aims to describe the problem-solving ability of fractional arithmetic operations reviewed from Keirsey's personality type. The research instrument is a personality questionnaire to determine the research subject, a problem-solving test to identify problem-solving abilities, and then an interview guideline to complete, dig deeper into data, and verify students' problem-solving ability data.

Data collection began with the provision of a personality questionnaire to 23 students of class VII A of SMP Negeri 18 Selayar. Then, 4 students were selected as research subjects with 1 student for each personality type. The subjects were selected based on the personality questionnaire score that best met the criteria for each personality. The following are the results of determining the subjects in the study.

Table 1. List of Subjects

Student Initials	Personality Type	Student Code
AAP	Guardian	SG
FA	Artisan	SA
W	Rational	SR
AF	Idealist	SI

The selected subjects were then given a problem-solving test of fractional arithmetic operations, then each subject was interviewed based on their answer sheets. Data from the test results and interviews were then analyzed to describe the subject's problem-solving abilities. The data analysis techniques in this study were 1) data reduction, 2) presenting data, and 3) concluding. The data validity test techniques were technical triangulation and time triangulation.

RESULTS AND DISCUSSION

This section presents the research data, namely a description of students' problem-solving abilities in fractional arithmetic operations viewed from the Keirsey personality type.

1. Guardian Personality Type Subject

Question 1

The following presents the results of SG's work on question 1.

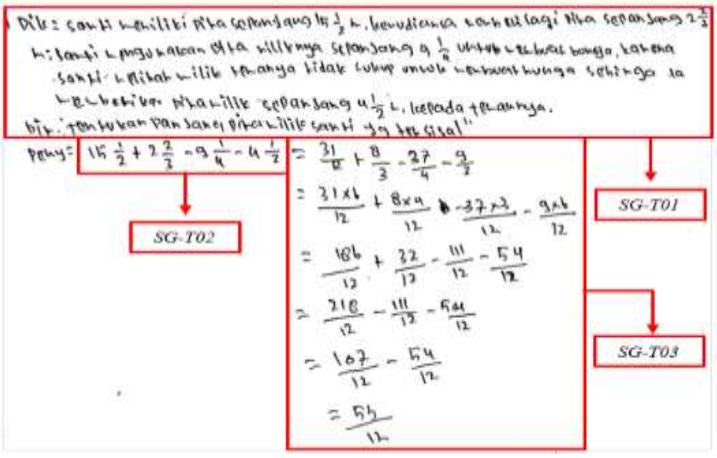

Figure 1. Results of SG's work on Question 1

Figure 1 shows that at the stage of understanding the problem, SG wrote down what was known and asked but was still in narrative form according to the question text (SG-T01). At the stage of making a solution plan, SG had written a mathematical model with an operational form (SG-T02). At the stage of implementing the solution plan, SG was able to complete the mathematical model with the correct steps, was able to change mixed fractions into ordinary fractions, was able to equate denominators, was able to understand the concept of addition and subtraction operations of fractional numbers (SG-T03). At the re-checking stage, SG did not write down the conclusion of the final result that he had obtained.

a. Understanding the problem stage

The following is an excerpt from SG's interview related to figure 1 regarding the stage of understanding the problem.

Transcript 1

P : *Coba Anda jelaskan soal nomor 1 dengan kalimat Anda sendiri?*

SG-W01 : *Santi mempunyai pita sepanjang* $15\frac{1}{2}$ *m dan ia membeli lagi* $2\frac{2}{3}$ *m. Namun santi menggunakan pitanya untuk membuat bunga sepanjang* $9\frac{1}{4}$ *dan memberikan kepada temannya sepanjang* $4\frac{1}{2}$ *m. Tentukan berapa Panjang pita milik santi yang*

tersisa?a

P : *Sebutkan informasi apa saja yang ada dapatkan dari soal?*

SG-W02 : *Diketahui: Santi memiliki pita sepanjang* $15\frac{1}{2}$ *m, kemudian ia membeli lagi pita sepanjang* $2\frac{2}{3}$ *m. Santi menggunakan pita miliknya sepanjang* $9\frac{1}{4}$ *untuk membuat bunga. Karena Santi melihat pita milik temannya tidak cukup untuk membuat bunga sehingga ia memberikan pita miliknya sepanjang* $4\frac{1}{2}$ *m kepada temannya Ditanyakan: Tentukan panjang pita milik Santi yang tersisa!"*

Transcript 1 shows that SG has been able to express the problem using his sentences (SG-W01). The subject is also able to express what is known and asked about the problem completely and accurately (SG-W02).

b. Stage of making a settlement plan

The following is an excerpt from SG's interview regarding figure 1 regarding the stages of creating a settlement plan.

Transcript 2

P : *Coba Anda jelaskan sehingga mendapatkan model matematika seperti ini?*

SG-W05 : *Sebelumnya saya mengulang-ulang membaca soal lalu bisa membuat model matematika dengan penjelasan Santi memiliki pita* $15\frac{1}{2}$*m dan membeli lagi* $2\frac{2}{3}$ *sehingga saya tambahkan, kemudian digunakan untuk membuat bunga sebanyak* $9\frac{1}{4}$ *m dan diberikan kepada temannya sebanyak* $4\frac{1}{2}$ *sehingga saya kurangi, hingga akhirnya menjadi* $15\frac{1}{2}+2\frac{2}{3}-9\frac{1}{4}-4\frac{1}{2}$

Transcript 2 shows that SG has been able to create a mathematical model of the problem correctly (SG-W05). The subject admitted that repeating reading the problem until the subject understood to change it into a mathematical model.

c. The stage of implementing the completion plan

The following is an excerpt from SG's interview regarding figure 1 regarding the stages of implementing the settlement plan.

Transcript 3

P : *Lalu bagaimana langkah-langkah penyelesaiannya?*

SG-W06 : *Pertama saya mengubah semua pecahan campuran menjadi pecahan biasa, lalu menyamakan penyebut dengan mencari KPK dari penyebut awalnya. Setelah mendapatkan penyebut yang sama, kemudian saya ubah pembilang seperti pada lembar jawaban saya.*

Transcript 3 shows that SG is able to complete the steps of solving the mathematical model correctly (SG-W06). The subject has understood the concept of addition and subtraction correctly (SG-W06).

d. The stage of checking again

The following is an excerpt from SG's interview regarding figure 1 regarding the re-checking stage.

Transcript 4

P	:	*Bagaimana kesimpulan dari jawabannya?*
SG-W08	:	*Jadi Panjang pita milik santi yang tersisa adalah* $\frac{53}{12}$ *m*
P	:	*Apakah Anda mengecek jawaban Anda sebelum lanjut pada soal nomor 2?*
SG-W09	:	*Ya, saya selalu mengecek jawaban saya sebelum lanjut pada nomor selanjutnya*
P		*Bagaimana cara Anda mengecek jawaban Anda?*
SG-W10	:	*Mengecek setiap langkah-langkah yang saya kerjakan, mulai dari yang diketahui dan ditanyakan, melihat kembali model matematika, kemudian menyamakan penyebut dan memeriksa kembali perkalian untuk hasil pembilangnya kemudian mengecek penjumlahan apakah ada salah perhitungan atau sudah benar*

Transcript 4 shows that SG can conclude correctly (SG-W08), SG double-checks the answers before collecting (SG-W09) and SG is also able to recheck his answers by looking back at the written steps and calculations (SG-W10).

Question 2

The following presents the results of SG's work on question 2.

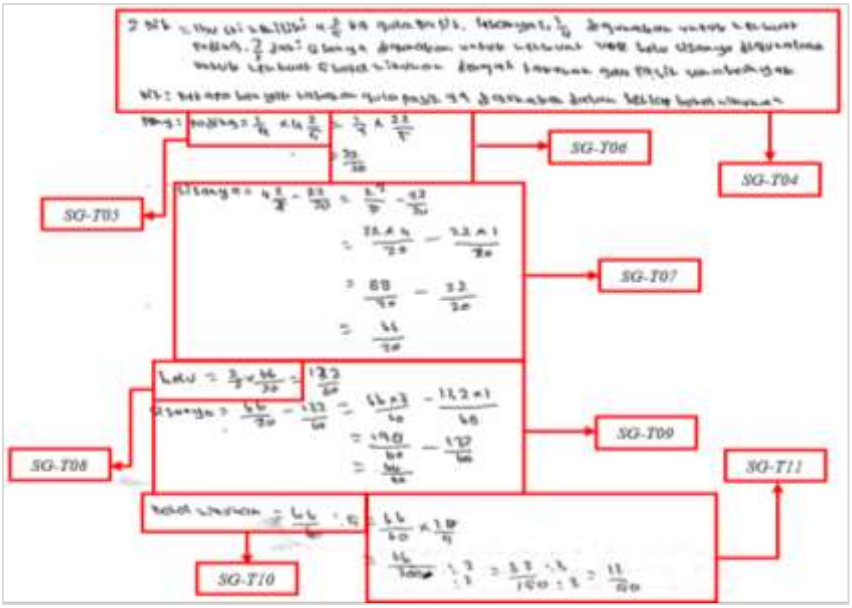

Figure 2. SG's Work Results on Question 2

Figure 2 shows that at the stage of understanding the problem, SG has written what is known and asked but is still in narrative form according to the question text (SG-T04). At the stage of making a solution plan, SG has made each mathematical model correctly but is still in the form of operations, not in

the form of symbols (SG-T05) (SG-T08) (SG-T10). At the stage of implementing the solution plan, SG has been able to complete each mathematical model created correctly, can change mixed fractions into ordinary fractions, can equate denominators, can understand the concept of reducing fractional numbers (SG-T07) (SG-T09), can understand the concept of multiplication and division of fractional numbers (SG-T06) (SG-T11). At the re-checking stage, the subject did not write down the conclusion of the answer obtained.

a. The stage of understanding the problem

The following is an excerpt from SG's interview regarding figure 2 regarding the stage of understanding the problem.

Transcript 5

P	:	*Sekarang nomor 2, coba jelaskan soal nomor 2 dengan kalimat Anda sendiri?*
SG-W13	:	*Ibu Sri memiliki* $4\frac{2}{5}$ *kg gula pasir dan Sebanyak* $\frac{1}{4}$ *digunakan untuk membuat puding dan* $\frac{2}{3}$ *dari sisanya digunakan untuk membuat kue bolo. Kemudian sisanya digunakan untuk membuat 5 botol minuman dengan takaran gula pasir sama banyak. Berapa banyak takaran gula pasir yang digunakan dalam setiap botol minuman?"*
P	:	*Sebutkan hal yang diketahui dan hal yang ditanyakan dari soal tersebut?*
SG-W14	:	*Diketahui: Ibu Sri memiliki* $4\frac{2}{5}$ *kg gula pasir. Sebanyak* $\frac{1}{4}$ *digunakan untuk membuat puding.* $\frac{2}{3}$ *dari sisanya digunakan untuk membuat kue bolu dan sisanya digunakan untuk membuat 5 botol minuman dengan takaran gula pasir sama banyak. Ditanyakan: Berapa banyak takaran gula digunakan dalam setiap botol?"*

Transcript 5 shows that SG can express problems using his sentences (SG-W13). The subject is also able to express what is known and asked about the problem correctly (SG-W14).

b. The stage of making a completion plan

The following is an excerpt from the SG interview regarding figure 2 regarding the stages of creating a resolution plan.

Transcript 6

P	:	*Jelaskan bagaimana cara Anda sehingga dapat membuat model matematika ini!*
SG-W17	:	*Saya membaca berulang kali soalnya karena awalnya saya bingung, menggunakan operasi kurang atau kali. Namun setelah membaca berulang kali saya menjadi yakin bahwa saya harus menggunakan operasi perkalian untuk bisa mendapatkan berapa kg gula pasir yang digunakan untuk membuat puding, karena pada soal itu bukan nominal dari gula pasing namun merupakan sebanyak* $\frac{1}{4}$ *bagian dari* $4\frac{2}{5}$*, sehingga untuk tahu berapa gula pasir yang digunakan saya mengalikan, setelah dapat hasilnya baru mencari berapa sisa gula pasir setelah membuat puding.*
P	:	*Lalu bagaimana dengan model matematika lainnya?*
SG-W18	:	*Menggunakan perkalian juga, jadi sisa gula setelah membuat puding, sisanya digunakan lagi untuk membuat kue bolu yaitu* $\frac{2}{3}$ *sehingga saya kali lagi untuk*

mendapatkan berapa gula untuk kue bolu, lalu mencari sisanya. Kemudian sisanya dibagi dengan 5, karena ada 5 botol minuman yang akan ditaruhkan gula didalamnya dengan ukuran sama banyak

Transcript 6 shows that SG can explain in detail related to the mathematical model obtained. However, previously SG admitted that he had to read the problem repeatedly until he could understand it (SG-W17).

c. The stage of implementing the completion plan

The following is an excerpt from the SG interview regarding figure 2 regarding the stages of implementing the settlement plan.

Transcript 7

P	:	*Bagaimana Langkah-langkah penyelesaian pengoperasiannya?*
SG-W19	:	*Pada perkalian langsung dikalikan tanpa menyamakan penyebut, kemudian pada pengurangan disamakan terlebih dahulu penyebutnya. Selanjutnya untuk pembagian dapat diubah menjadi perkalian dengan catatan pecahan yang dibelakang dibalik*
P	:	*Bagaimana hasil akhir yang Anda dapatkan?*
SG-W20	:	*Jadi hasil akhir yang saya dapatkan adalah* $\frac{11}{25}$ *kg*

Transcript 7 shows that SG can complete the solution steps correctly (SG-W19). SG has a good understanding of the concept of multiplication, subtraction, and division operations on integers so the final answer obtained is correct (SG-W20).

d. The stage of checking again

The following is an excerpt from SG's interview regarding figure 2 regarding the re-checking stage.

Transcript 8

P	:	*Apa yang Anda dapat simpulkan dari jawaban yang Anda dapatkan?*
SG-21	:	*Jadi banyak takaran gula pasir yang digunakan dalam setiap botol minuman* $\frac{11}{50}$ *kg*
P	:	*Apakah Anda mengecek jawaban Anda sebelum mengumpulkan?*
SG-22	:	*Saya selalu mengecek setiap jawaban saya jika selesai mengerjakannya.*
P	:	*Bagaimana langkah-langkah yang Anda lakukan dalam mengecek jawaban Anda?*
SG-23	:	*Saya melihat dari hal yang diketahui dan ditanyakan, kemudian melihat kembali model matematika yang saya buat, kemudian melihat langkah-langkah pengerjaan saya misalkan dalam mencari KPK apakah sudah benar atau ada yang salah, dalam menghitung pembilangnya saya selalu mengecek barangkali ada perkalian saya yang salah*

Transcript 8 shows that SG has been able to state conclusions from the final results obtained even though the subject did not write a conclusion on the answer sheet (SG-21). Then SG also checked his answers again when he finished working on the questions (SG-23).

The problem-solving ability of fractional number arithmetic operations of guardian personality type subjects based on problem-solving ability indicators according to Polya's theory is 1) in understanding the problem, namely being able to re-explain the problem in one's own words and being able to identify information about things that are known and asked but still in narrative form according to the question text, 2) in compiling a solution plan, namely being able to change the problems of questions 1 and 2 into a mathematical model even though they are not yet in the form of symbols, 3) in implementing the solution plan, namely being able to solve the mathematical model with the correct steps, being able to change mixed fractions into ordinary fractions and vice versa, being able to equate the denominators of fractional numbers, being able to change the numerator of fractional numbers if the denominators are the same, being able to understand the concept of addition, subtraction, multiplication and division of fractional numbers, 4) in re-checking, namely being able to draw conclusions from the results obtained, being able to re-check the steps written, and being able to re-check the calculations, but in the process of understanding the problem tends to be long and requires reading the questions repeatedly. This is in line with the results of Mulyodoro (2017) study which stated that students with the guardian personality type are known to take a long time to understand the problem compared to other problem-solving stages because students need to read repeatedly to understand the questions. However, the guardian subject was able to fulfill all stages of Polya's problem-solving. This is by the results of Mufidah, Abidin, and Nursit (2021) study which stated that the Guardian personality type can fulfill all the steps of mathematical problem-solving ability. Meanwhile, it is different from the results of Wahyuni's study which stated that the problem-solving ability of the Guardian personality type was able to carry out the stage of understanding the problem, but the subject was still lacking in making plans, implementing plans, and had not been able to see the solution again.

2. Artisan Personality Type Subject

Question 1

The following presents the results of SA's work on question 1.

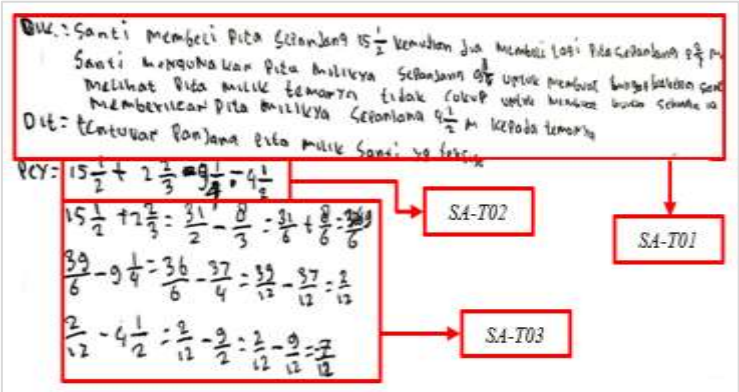

Figure 3. Results of SA's Work on Question 1

Figure 3 shows that at the stage of understanding the problem, SA has written what is known and asked correctly but is still in narrative form according to the question text (SA-T01). At the stage of making a solution plan, SA wrote the mathematical model correctly but not in symbol form (SA-T02). At the stage of implementing the solution plan, SA made a mistake in solving the mathematical model, SA can change mixed fractions into ordinary fractions, and can equate the denominators but cannot change the numerators (SA-T03). At the rechecking stage, in the answer, it can be seen that SA did not write the conclusion of the answer obtained.

1) The stage of understanding the problem

The following is an excerpt from the SA interview related to figure 3 regarding the stage of understanding the problem.

Transcript 9

P	:	*Coba kamu jelaskan soal nomor 1 dengan kalimat Anda sendiri?*
SA-W01	:	*Santi mempunyai pita sepanjang* $15\frac{1}{2}$ *m dan membeli lagi* $2\frac{2}{3}$ *m. Santi menggunakan pitanya sebanyak* $9\frac{1}{4}$ *m untuk keperluan bunga dan juga memberikan pita kepada temannya sepanjang* $4\frac{1}{2}$ *m. Jadi sisa berapa pita yang dimiliki santi?*
P	:	*Coba sebutkan informasi apa saja yang ada dapatkan?*
SA-W02	:	*Diketahui: Santi memiliki pita sepanjang* $15\frac{1}{2}$ *m, kemudian ia membeli lagi pita sepanjang* $2\frac{2}{3}$ *m. Santi menggunakan pita miliknya sepanjang* $9\frac{1}{4}$ *untuk membuat bunga. Karena Santi melihat pita milik temannya tidak cukup untuk membuat bunga sehingga ia memberikan pita miliknya sepanjang* $4\frac{1}{2}$ *m kepada temannya Ditanyakan: Tentukan panjang pita milik Santi yang tersisa!"*

Transcript 9 shows that SA has been able to express the problem in his own words (SA-W01). Then SA has been able to mention things that are known and asked from the problem correctly (SA-W02).

2) The stage of making a completion plan

The following is an excerpt from the SA interview related to figure 3 regarding the stages of creating a resolution plan.

Transcript 10

P : *Coba Anda jelaskan bagaimana cara Anda sehingga model matematikanya seperti ini?*

SA-W05 : *Pertama ada pita sepanjang* $15\frac{1}{2}$ *m kemudian membeli lagi* $2\frac{2}{3}$ *dsehingga saya jumlahkan* $15\frac{1}{2} + 2\frac{2}{3}$ *, karena santi menggunakan pitanya sebanyak* $9\frac{1}{4}$ *sehingga dikurangi yaitu* $15\frac{1}{2} + 2\frac{2}{3} - 9\frac{1}{4}$ *dan santi memberikan pita miliknya kepada temannya sebanyak* $4\frac{1}{2}$ *sehingga modelnya menjadi* $15\frac{1}{2} + 2\frac{2}{3} - 9\frac{1}{4} - 4\frac{1}{2}$

Transcript 10 shows that SA has explained the mathematical model obtained and the mathematical model is correct (SA-W05).

3) The stage of implementing the completion plan

The following is an excerpt from the SA interview related to figure 3 regarding the stages of implementing the settlement plan.

Transcript 11

P : *Coba Anda jelaskan kembali langkah-langkah penyelesaian*

SA-W07 : *Pertama karena ada pecahan campuran maka saya mengubahnya dulu menjadi pecahan biasa seperti* $15\frac{1}{2} = \frac{31}{2}$ *dan* $2\frac{2}{3} = \frac{8}{3}$ *sehingga* $\frac{31}{2} + \frac{8}{3}$*.untuk menjumlahkan bilangan pecahan tersebut terlebih dalu saya mencari kpk dari penyebutnya atau menyamakan penyebunya dan saya mendapatkan penyebut 6 sehingga* $\frac{31}{2} + \frac{8}{3} = \frac{31}{6} + \frac{8}{6} = \frac{39}{6}$*, begitu selanjutnya juga kak.*

P : *Mengapa pada langkah* $\frac{31}{2} - \frac{8}{3}$ *Anda menggunakan operasi kurang padahal sebelumnya tambah*

SA-W08 : *Saya salah tulis, harusnya tanda tambah*

P : *Kenapa bisa salah salah tulis?*

SA-W09 : *Saya selalu begitu karena terburu-buru menulis dan tidak memeriksa ulang*

Transcript 11 shows that SA misunderstands the concept of addition and subtraction operations of fractions (SA-W07). In writing SA sometimes makes mistakes because the subject is in a hurry and does not focus on working (SA-W09).

4) The stage of checking again

The following is an excerpt from the SA interview regarding figure 3 regarding the re-checking stage.

Transcript 12

P	:	*Bagaimana kesimpulan dari jawaban akhir yang Anda dapatkan?*
SA-W14	:	*…..*
P	:	*Apakah Anda yakin dengan jawaban Anda bernilai negatif?*
SA-W15	:	*Yakin karena itu yang saya dapatkan*
P	:	*Apakah Anda mengecek kembali jawaban sebelum mengerjakan soal nomor 2?*
SA-W16	:	*Tidak*

Transcript 12 shows that SA was unable to draw conclusions from the answers obtained (SA-W14). SA also did not check his answers when he finished (SA-W16).

Question 2

The following presents the results of SA's work on question 2.

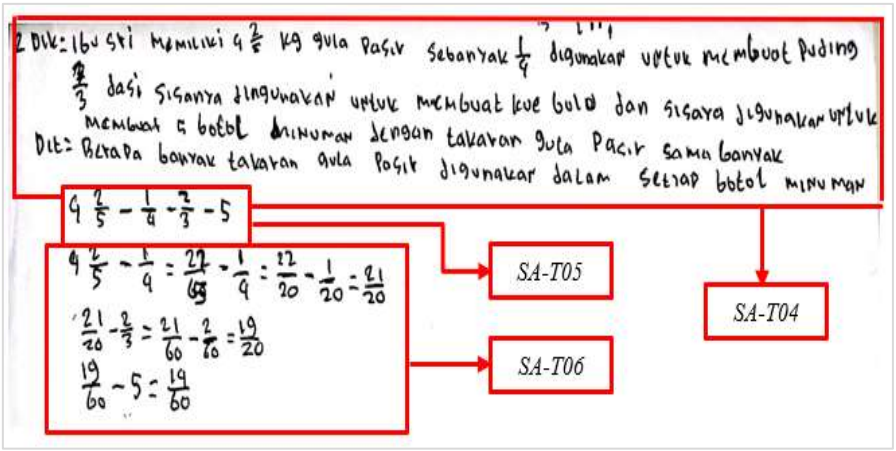

Figure 4. Results of SA's Work on Question 2

Figure 4 shows that at the stage of understanding the problem, SA has written what is known and asked from the problem correctly but the writing is still in narrative form according to the question text (SA-T04). At the stage of making a solution plan, SA wrote the mathematical model incorrectly (SA-T05). At the stage of implementing the solution plan, SA did not change the numerator, so an error occurred. This is suspected because SA did not understand the steps in completing addition and subtraction arithmetic operations. So that the final result obtained was wrong (SA-T06). At the re-checking stage, SA did not write a conclusion from the answer.

1) The stage of understanding the problem

The following is an excerpt from the SA interview related to figure 4 regarding the stage of understanding the problem.

Transcript 13

P	:	*Lanjut pada soal nomor 2, coba Anda jelaskan dengan kalimat Anda sendiri!*
SA-W17	:	*Ibu sri mempunyai* $4\frac{2}{5}$ *kg gula pasir dan sebanyak* $\frac{1}{4}$ *digunakan untuk membuat pudding. Kemudian* $\frac{2}{3}$ *dari sisanya akan digunakan untuk membuat kue bolu dan sisanya lagi digunakan untuk membuat 5 botol minuman dengan takaran gula yang sama. Berapa takaran gula tiap botol?*
P	:	*Sebutkan hal apa yang diketahui dan hal yang ditanyakan pada soal!*
SA-W18	:	*Diketahui: Ibu Sri memiliki* $4\frac{2}{5}$ *kg gula pasir. Sebanyak* $\frac{1}{4}$ *digunakan untuk membuat puding.* $\frac{2}{3}$ *dari sisanya digunakan untuk membuat kue bolu dan sisanya digunakan untuk membuat 5 botol minuman dengan takaran gula pasir sama banyak. Ditanyakan: Berapa banyak takaran gula pasir yang digunakan dalam setiap botol minuman?"*

Transcript 13 shows that SA has been able to express problems using his own sentences (SA-W17). SA has also been able to determine what is known and what is asked from the problem (SA-W18).

2) The stage of making a completion plan

The following is an excerpt from the SA interview related to figure 4 regarding the stages of creating a resolution plan.

Transcript 14

P	:	*Coba Anda jelaskan bagaimana Anda bisa membuat model matematika seperti ini*
SA-W21	:	*Pertama ada* $4\frac{2}{5}$ *gula kemudian sebanyak* $\frac{1}{4}$ *digunakan untuk membuat pudding sehingga saya mengurangkannya,* $4\frac{2}{5} - \frac{1}{4}$ *kemudian .* $\frac{2}{3}$ *dari sisanya digunakan untuk membuat kue bolu sehingga menjadi* $4\frac{2}{5} - \frac{1}{4} - \frac{2}{3}$ *dan sisanya lagi untuk 5 botol minuman sehingga* $4\frac{2}{5} - \frac{1}{4} - \frac{2}{3} - 5$

Transcript 14 shows that SA incorrectly changed the problem into mathematical form so the mathematical model created was incorrect (SA-W21).

3) The stage of implementing the completion plan

The following is an excerpt from the SA interview related to figure 4 regarding the stages of implementing the settlement plan.

Transcript 15

P	:	*Lalu bagaimana Langkah-langkah penyelesaiannya?*
SA-W22	:	*Saya selesaikan dengan cara seperti soal nomor 1, dimana terlebih dahulu mengubah pecahan campuran menjadi pecahan biasa dan menyamakan penyebutnya dengan cara mencari KPK*
P	:	*Namun Anda tidak mengubah pembilangnya*
SA-W23	:	*Iya*
P	:	*Mengapa?*
SA-W24	:	*Karena seperti itu yang saya pahami*

Transcript 15 shows that SA also made errors in the steps of solving the model listed (SA-W22) so the final results obtained were incorrect.

4) The stage of checking again

The following is an excerpt from the SA interview regarding figure 4 regarding the re-checking stage.

Transcript 16

P	:	*Bagaimana kesimpulan dari jawaban akhir yang diperoleh?*
SA-W26	:	*…tidak tahu*
P	:	*Apakah Anda mengecek kembali jawaban Anda sebelum mengumpulkan?*
SA-W27	:	*Tidak*

Transcript 16 shows that SA was unable to conclude the problem (SA-W26) and SA did not check his work again before submitting it (SA-W27).

The problem-solving ability of fractional number arithmetic operations of artisan personality type subjects based on problem-solving ability indicators according to Polya's theory is 1) in understanding the problem, namely being able to re-explain the problem in your own words and being able to identify information about what is known and asked but the writing is still in narrative form according to the question text, 2) in making a plan, namely being able to change problem 1 into a mathematical model but not being able to do so in problem 2, 3) in implementing a solution plan, namely being unable to solve the mathematical model with the correct steps, being able to change mixed fractions into ordinary fractions and vice versa, being able to equate the denominators of fractions, being unable to change the numerator of fractions if the denominators are the same, being able to understand the concept of addition, subtraction and multiplication of fractions, and being unable to understand the division of fractions, 4) in re-checking, namely being unable to draw conclusions from the results obtained, being unable to re-check the steps written, and being unable to re-check the calculations. This is in line with the results of Mufidah, Abidin, and Nursit (2021) which state that the artisan personality type can only fulfill the steps of problem-solving ability in the step of understanding the problem. The subject presents answers in a disjointed manner, tends to be wrong, and rushes when working. Meanwhile, this is different from the results of Kumalasari, Winarni, Rohati, Marlina, and Saputra (2022) study that students with an artisan personality can fulfill the four indicators of problem-solving according to Polya, namely understanding the problem, making a plan, carrying out the solution plan and checking again. The characteristics of mathematical problem solving for students with an

artisan personality type follow the opinion of Keirsey and Bates (1984) that the artisan type likes change and cannot stand stability, does everything quickly, and even tends to be too hasty.

3. Rational Personality Type Subject

Question 1

The following presents the results of SR's work on question 1.

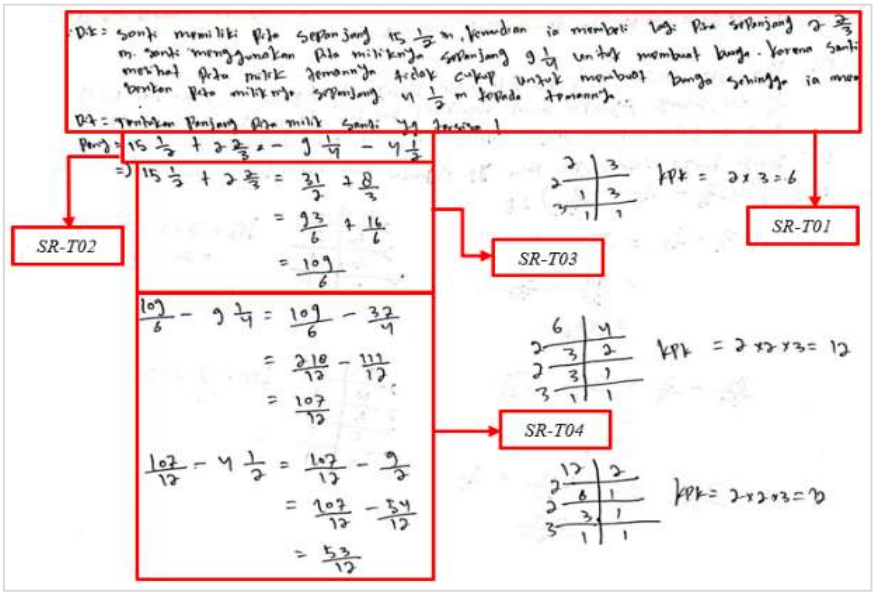

Figure 5. Results of SR's Work on Question 1

Figure 5 shows that at the stage of understanding the problem, SR has written what is known and asked correctly but is still in narrative form according to the question text (SR-T01). At the stage of making a solution plan, SR wrote the mathematical model correctly but not yet in symbol form (SR-T02). At the stage of implementing the solution plan, SR has completed the mathematical model by searching one by one correctly, can change mixed fractions to ordinary fractions, can equate denominators, and find numerators (SR-T03) (SR-T04). So that the final result obtained is correct. At the re-checking stage, SR did not write a conclusion from the final result obtained.

1) The stage of understanding the problem

The following is an excerpt from SR's interview related to figure 5 regarding the stage of understanding the problem.

Transcript 17

P : *Coba kamu jelaskan soal nomor 1 dengan kalimat Anda sendiri?*

SR-W01 : *Santi mempunyai pita dengan ukuran* $15\frac{1}{2}$ *m dan membeli lagi pita sepanjang*

$2\frac{2}{3}$*m. Kemudian sebanyak* $9\frac{1}{4}$ *m digunakan untuk membuat bunga dan* $4\frac{1}{2}$*m diberikan kepada temannya yang akan membuat bunga juga. Jadi berapa Panjang pita milik santi yang tersisa?*

P : *Sebutkan informasi apa saja yang ada dapatkan dari soal?*

SR-W02 : *Diketahui: Santi memiliki pita sepanjang* $15\frac{1}{2}$ *m, kemudian ia membeli lagi pita sepanjang* $2\frac{2}{3}$ *m. Santi menggunakan pita miliknya sepanjang* $9\frac{1}{4}$ *untuk membuat bunga. Karena Santi melihat pita milik temannya tidak cukup untuk membuat bunga sehingga memberikan pita miliknya sepanjang* $4\frac{1}{2}$*m kepada temannya. Ditanyakan: Tentukan panjang pita milik Santi yang tersisa!"*

Transcript 17 shows that SR can express the problem with his sentence (SR-W01). Then SR can determine what is known and asked correctly but still in narrative form according to the question text (SR-W02).

2) The stage of making a completion plan

The following is an excerpt from SR's interview related to figure 5 regarding the stages of creating a resolution plan.

Transcript 18

P : *Coba jelaskan bagaimana Anda bisa mendapatkan model matematika seperti ini?*

SR-W05 : *Santi mempunyai pita dengan ukuran* $15\frac{1}{2}$ *m dan membeli lagi pita sepanjang* $2\frac{2}{3}$*m.Sehingga* $15\frac{1}{2}+2\frac{2}{3}$*, Kemudian sebanyak* $9\frac{1}{4}$ *m digunakan untuk membuat bunga, sehingga menjadi* $15\frac{1}{2}+2\frac{2}{3}$ -$9\frac{1}{4}$ *dan selanjutnya sepanjang* $4\frac{1}{2}$*m diberikan kepada temannya yang akan membuat bunga juga, jadinya* $15\frac{1}{2}+2\frac{2}{3}$ -$9\frac{1}{4}$ -$4\frac{1}{2}$

Transcript 18 shows that SR can explain mathematical models correctly but they are still in the form of operations, not symbols (SR-W05).

3) The stage of implementing the completion plan

The following is an excerpt from SR's interview related to figure 5 regarding the stages of implementing the settlement plan.

Transcript 19

P : *Lalu bagaimana Langkah-langkah penyelesaiannya?*

SR-W06 : *Saya cari satu persatu mulai dari* $15\frac{1}{2}+2\frac{2}{3}$*, kemudian mengubah pecahan campuran menjadi pecahan biasa sehingga menjadi* $\frac{31}{2}+\frac{8}{3}$*, kemudian menyamakan penyebutnya dengan cara mencari KPK dari penyebut, KPK dari 2 dan 3 adalah 6 sehingga saya menggunakan penyebut 6, sehingga menjadi* $\frac{31x3}{6}+\frac{16x2}{6}=\frac{93}{6}+\frac{16}{6}=\frac{109}{6}$*, kemudian lanjut lagi* $\frac{109}{6}$-$9\frac{1}{4}$*, seperti ini dilembar jawaban yang saya tulis*

Transcript 19 shows that SR can explain one of the solutions to the written mathematical model (SR-W06). Starting from changing mixed fractions into ordinary fractions, equating denominators, finding numerators, and

operating fractional numbers. The subject can understand the operations of adding and subtracting fractional numbers.

4) The stage of checking again

The following is an excerpt from SR's interview regarding figure 5 regarding the re-checking stage.

Transcript 20

P	:	*Apa kesimpulan yang ada bisa simpulkan dari jawaban Anda?*
SR-W08	:	*Jadi Panjang pita milik santi yang tersisa adalah* $\frac{53}{12}$ m
P	:	*Apakah Anda melakukan pemeriksaan ulang atau mengecek ulang jawaban Anda sebelum melanjutkan pada soal nomor 2?*
SR-W09	:	*Iya, saya mengecek semua jawaban saya untuk memastikan lengkap, benar dan selesai*
P	:	*Bagaimana langkah-langkah yang Anda lakukan dalam mengecek jawaban Anda?*
SR-W10	:	*Mengecek semua langkah-langah yang saya tulis, apakah sudah benar dalam mengubah pecahan campuran menjadi pecahan biasa, apakah sudah benar dalam menyamakan penyebut dan mencari pembilangnya dan apakah sudah cocok perhitungan perkalian, penjumlahan dan penguarangn yang saya lakukan*

Transcript 20 shows that SR can conclude the answers obtained (SR-W08). SR is also able to check the answers by looking back at the writing of what is known and asked, the mathematical model along with the steps written in solving the mathematical model, and rechecking the calculations that have been done in completing the steps (SR-W10).

Question 2

The following presents the results of SR's work on question 2.

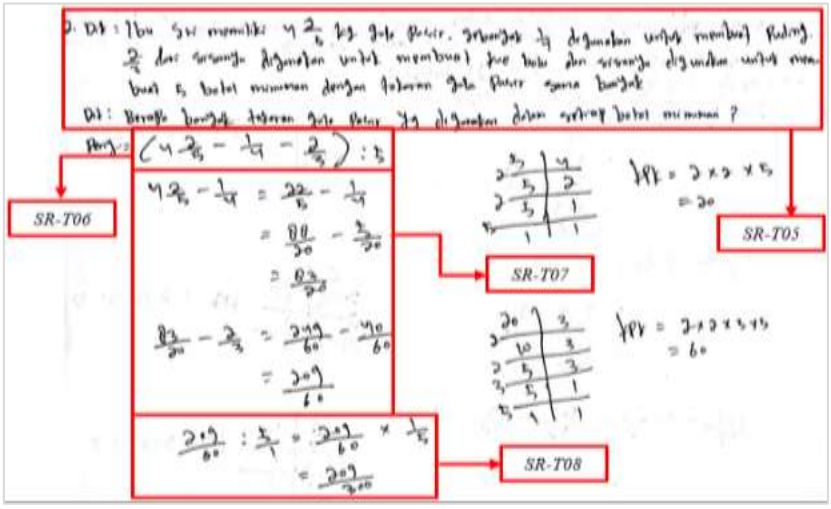

Figure 6. Results of SR's Work on Question 2

Figure 6 shows that at the stage of understanding the problem, SR has written down what is known and asked completely and accurately (SR-T05).

At the stage of making a solution plan, the subject has written the mathematical model incorrectly (SR-T06). At the stage of implementing the solution plan, looking at the steps written by the subject based on the mathematical model written is correct (SR-T07). In the subject's answer, it is also seen that he has been able to operate division and multiplication on fractional numbers (SR-T08). However, because the mathematical model used is wrong, the results obtained are not correct for the problem being solved. At the re-checking stage, the subject did not write down the conclusion of the answer obtained.

1) The stage of understanding the problem

The following is an excerpt from SR's interview related to figure 6 regarding the stage of understanding the problem.

Transcript 21

P	:	*Lanjut nomor 2, coba Anda jelaskan soal nomor 2 dengan kalimat Anda sendiri!*
SR-W12	:	*Ibu Sri memiliki* $4\frac{2}{5}$ *kg gula pasir kemudian* $\frac{1}{4}$ *digunakan untuk membuat puding dan* $\frac{2}{3}$ *dari sisanya digunakan untuk membuat kue bolu. Sisanya akan digunakan untuk membuat 5 botol minuman dengan takaran gula pasir sama banyak, jadi berapa takaran gula pasir setiap botol minuman?*
P	:	*Sebutkan apa saja hal yang diketahui dan ditanyakan dari soal tersebut?*
SR-W13	:	*Diketahui: Ibu Sri memiliki* $4\frac{2}{5}$ *kg gula pasir. Sebanyak* $\frac{1}{4}$ *digunakan untuk membuat puding.* $\frac{2}{3}$ *dari sisanya digunakan untuk membuat kue bolu dan sisanya digunakan untuk membuat 5 botol minuman dengan takaran gula pasir sama banyak* *Ditanyakan: Berapa banyak takaran gula pasir yang digunakan dalam setiap botol minuman?"*

Transcript 21 shows that SR can restate the problem in his/her own words (SR-W12). SR is also able to determine what is known and asked completely and correctly (SR-W13).

2) The stage of making a completion plan

The following is an excerpt from SR's interview related to figure 6 regarding the stages of creating a resolution plan.

Transcript 22

P	:	*Coba Anda jelaskan darimana Anda bisa membuat model matematika seperti pada lembar jawaban Anda*
SR-W16	:	*Pertama ada* $4\frac{2}{5}$ *gula pasir kemudian sebanyak* $\frac{1}{4}$ *digunakan untuk membuat puding sehingga saya kurangkan menjadi* $4\frac{2}{5}-\frac{1}{4}$*, kemudian* $\frac{2}{3}$ *dari sisanya digunakan untuk membuat kue bolu, jadinya* $4\frac{2}{5}-\frac{1}{4}-\frac{2}{3}$*, selanjutnya sisanya akan digunakan untuk membuat 5 botol minuman sehingga dibagi, jadinya adalah* $(4\frac{2}{5}-\frac{1}{4}-\frac{2}{3}):5$

Transcript 22 shows that SR misinterpreted the problem in mathematical form (SR-W16).

3) The stage of implementing the completion plan

The following is an excerpt from SR's interview related to figure 6 regarding the stages of implementing the settlement plan.

Transcript 23

P	:	*Lalu bagaimana Langkah-langkah penyelesaiannya?*
SR-W18	:	*Mengerjakan satu persatu kemudian mengubah pecahan campuran menjadi pecahan biasa, lalu menyamakan penyebutnya dengan cara mencari KPK dari penyebut, kemudian mengubah pembilangnya sesuai dengan penyebut yang didapatkan, kemudian menghitung jawabannya. Lalu diakhir saya bagi dengan 5 seperti pada lembar jawaban saya.*

Transcript 23 shows that the SR related to the mathematical model completed is correct. SR can understand the concepts of addition, subtraction, multiplication, and division of fractions well (SR-W18).

4) The stage of checking again

The following excerpts of SR interviews are related to figure 6 regarding the stage of re-examining.

Transcript 24

P	:	*Coba Anda simpulkan jawaban yang Anda dapatkan!*
SR-W20	:	*Jadi banyaknya takaran gula pasir yang digunakan dalam setiap botol minuman adalah* $\frac{209}{300}$ *kg*
P	:	*Apakah Anda mengecek jawaban Anda sebelum mengumpulkan?*
SR-W21	:	*Ya, saya selalu mengecek pekerjaan saya setiap selesai mengerjakan soal*
P	:	*Bagaimana langkah-langkah yang Anda lakukan dalam mengecek jawaban Anda?*
SR-W22	:	*Mengecek semua langkah-langah yang saya tulis pada pekerjaan saya, apakah sudah benar dalam mengubah pecahan campuran menjadi pecahan biasa, apakah sudah benar dalam menyamakan penyebut dan mencari pembilangnya dan apakah sudah cocok perhitungan perkalian, pembagia , penjumlahan dan penguarangn yang saya lakukan*

Transcript 24 shows that SR can conclude the answers obtained (SR-W20). SR is also able to re-check every step written (SR-W21).

The problem-solving ability of fractional number arithmetic operations of rational personality type subjects based on the problem-solving ability indicators according to Polya's theory is 1) in understanding the problem, namely being able to re-explain the problem in your own words and being able to identify information about things that are known and asked but are still in the form of narratives according to the question text, 2) in compiling a solution plan, namely being able to change problem 1 into a mathematical

model but not being able to in problem 2, 3) in implementing the solution plan, namely being able to solve the mathematical model with the correct steps, being able to change mixed fractions into ordinary fractions and vice versa, being able to equate the denominators of fractions, being able to change the numerator of fractions if the denominators are the same, being able to understand the concept of addition, subtraction, multiplication and division of fractions, 4) in re-checking, namely being able to draw conclusions from the results obtained, being able to re-check the steps written, and being able to re-check the calculations. This is in line with the research of Rabbani, Baidowi, Wahidaturrahmi, and Sripatmi (2022) which states that subjects with a rational personality type were for the stages of understanding the problem, implementing the solution plan, and reviewing, rational subjects have been able to carry it out well, but for the stage of making a solution plan, rational subjects have not been able to carry it out optimally. At the re-checking stage, the subject has no other way to check, only looking at the steps and calculations. This is contrary to the results of the study by Ilmiyana (2018) which states that students with a rational personality type tend to be quick to understand problems, rational students develop their ideas even though they are a little confused and students write down the conclusions of their solutions and can find other ways to re-check their answers.

4. Idealist Personality Type Subject

Question 1

The following presents the results of SI work in question 1.

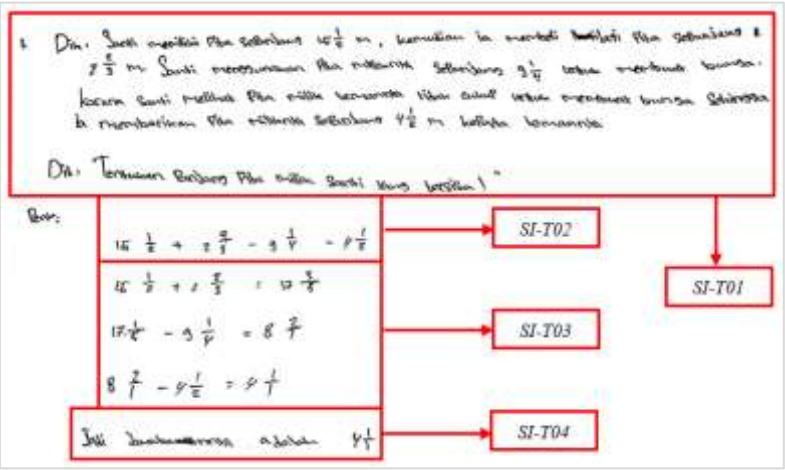

Figure 7. Results of SI's Work on Question 1

Figure 7 shows that at the stage of understanding the problem, SI has written what is known and asked but is still in the form of narration by the text of the question (SI-T01). At the stage of making a completion plan, SI has written the mathematical model correctly but in the settlement step, there is an error (Si-T02). The mathematical model written is still in the form of operations, not in the form of symbols. At the stage of implementing the completion plan, SI immediately adds up and subtracts the number of fractions without equating the denominator first (Si-T03). So that the final results obtained are not quite right. At the stage of re-examining, SI does not write the conclusions of the answers that have been obtained (SI-T04).

1) The stage of understanding the problem

The following excerpt from the interview related to figure 7 regarding the stage of understanding the problem.

Transcript 25

P	:	*Coba Anda jelaskan soal dengan kalimat sendiri?*
SI-W02	:	*"Pita santi* $15\frac{1}{2}$ *m, kemudian membeli lagi* $2\frac{2}{3}$ *m namun santi menggunakan* $9\frac{1}{4}$ *untuk membuat bunga dan santi memberi pita kepada temannya* $4\frac{1}{2}$ *m. tentukan berapa Panjang pita milik santi yang tersisa".*
P	:	*Silahkan Anda sebutkan hal yang diketahui dan hal yang ditanyakan dari soal*
SI-W03	:	*Diketahui: pita sepanjang* $15\frac{1}{2}$ *m, kemudian ia membeli lagi pita sepanjang* $2\frac{2}{3}$ *m. Santi menggunakan pita miliknya sepanjang* $9\frac{1}{4}$ *untuk membuat bunga. Karena Santi melihat pita milik temannya tidak cukup untuk membuat bunga sehingga ia memberikan pita miliknya sepanjang* $4\frac{1}{2}$ *m kepada temannya* *Ditanyakan: Tentukan panjang pita milik Santi yang tersisa!"*

Transcript 25 shows that SI has been able to reveal the problem using his sentence (SI-W02). SI can also state things known and asked from the problem completely (Si-W03).

2) The stage of making a completion plan

The following excerpt from the interview related to figure 7 regarding the stage of making a completion plan.

Transcript 26

P	:	*Coba Anda jelaskan bagaimana Anda bisa membuat model matematika yang Anda tulis pada lembar jawaban*
SI-W07	:	*Pada soal awalnya ada* $15\frac{1}{2}$ *m, kemudian membeli lagi* $2\frac{2}{3}$ *sehingga saya menggunakan operasi tambah, selanjutnya digunakan sebanyak* $9\frac{1}{4}$ *m sehingga saya menggunakan "kurang" dan diberikan kepada temannya* $4\frac{1}{2}$ *sehingga menggunakan "kurang" lagi. Jika saya gabungkan menjadi "*$15\frac{1}{2} + 2\frac{2}{3} - 9\frac{1}{4} - 4\frac{1}{2}$ *".*

Transcript 26 shows that SI can determine the mathematical model of the problem problem precisely (Si-W07).

3) The stage of implementing the completion plan

The following excerpt from the interview related to figure 7 regarding the stage of implementing the completion plan.

Transcript 27

P	:	*Terus bagaimana langkah-langkah penyelesaiannya?*
SI-W08	:	*Saya menjumlahkan yang didepan kemudian menjumlahkan bilangan pecahannya, begitu pula dengan pengurangan seperti pada lembar jawaban saya*
P	:	*Coba Anda jelaskan kembali*
SI-W09		$15\frac{1}{2} + 2\frac{2}{3} - 9\frac{1}{4} - 4\frac{1}{2}$ *" pertama* $15\frac{1}{2} + 2\frac{2}{3} =$ *(15+2) jadinya 17 kemudian 1 +2 =3 dan 2+3 =5 sehingga* $17\frac{3}{5}$*. Kemudian* $17\frac{3}{5} - 9\frac{1}{4} = 8\frac{2}{1} - 4\frac{1}{2} = 4\frac{1}{1}$*. Jadi jawabannya* $4\frac{1}{1}$*.*

Transcript 27 shows that SI cannot operate addition and subtraction to fractions correctly (Si-W08). SI assumes that the addition and reduction in the fraction number is the same as the concept of addition and reduction of integers (Si-W09).

4) The stage of checking again

The following excerpt from the interview related to figure 7 regarding the stage of re-examining.

Transcript 28

P	:	*Bagaimana kesimpulan dari hasil yang Anda peroleh?*
SI-W11	:	*Jadi jawabannya adalah* $4\frac{1}{1}$*.*
P	:	*Apa maksud dari jawaban itu?*
SI-W12	:	*Saya tidak tahu*
P	:	*Apakah Anda mengecek atau memeriksa jawaban Anda sebelum melanjutkan pada soal nomor 2?*
SI-W13	:	*Tidak*

Transcript 28 shows that SI cannot conclude from the final results that have been obtained (SI-W12) and SI did not check the work before continuing (Si-W13).

Question 2

The following presents the results of SI's work on question 2.

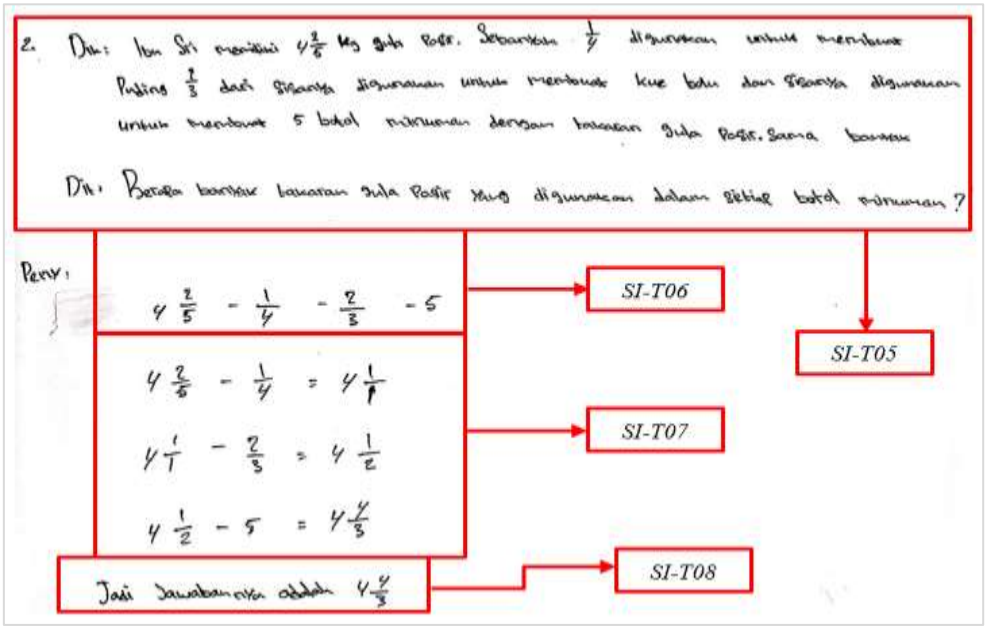

Figure 8. Results of SI's Work on Question 2

Figure 8 shows that at the stage of understanding the problem, SI has written down what is known and asked correctly but is still in the form of a narrative according to the question text (SI-T05). At the stage of creating a solution plan, SI wrote the mathematical model incorrectly (SI-T06). At the stage of implementing the solution plan, SI directly adds and subtracts fractional numbers without first equating the denominators (SI-T07). At the re-examination stage, SI did not write conclusions from the answers obtained (SI-T08).

1) The stage of understanding the problem

The following is an excerpt from the SI interview related to figure 8 regarding the stage of understanding the problem.

Transcript 29

P	:	*Coba Anda jelaskan dengan menggunakan kalimat sendiri*
SI-W16	:	*"Ibu Sri memiliki* $4\frac{2}{5}$ *kg gula pasir. Sebanyak* $\frac{1}{4}$ *digunakan untuk pudding dan dari sisanya yaitu* $\frac{2}{3}$ *digunakan untuk membuat kue bolu. sisanya lagi digunakan untuk membuat 5 botol minuman dengan takaran gula pasir sama banyak. Berapa banyak takaran gula pasir yang digunakan dalam setiap botol minuman?"*
P	:	*Coba Anda paparkan apa yang diketahui dan apa yang ditanyakan?*
SI-W17	:	*Diketahui: Ibu Sri memiliki* $4\frac{2}{5}$ *kg gula pasir. Sebanyak* $\frac{1}{4}$ *digunakan untuk membuat puding.* $\frac{2}{3}$ *dari sisanya digunakan untuk membuat kue bolu dan sisanya*

digunakan untuk membuat 5 botol minuman dengan takaran gula pasir sama banyak
Ditanyakan: Berapa banyak takaran gula pasir yang digunakan dalam setiap botol minuman?"

Transcript 29 shows that SI has been able to express the problem in his sentence (SI-W16). The subject has also been able to state what is known and asked from the question completely (SI-W17).

2) The stage of making a completion plan

The following is an excerpt from the SI interview regarding figure 8 regarding the stages of creating a resolution plan.

Transcript 30

P	:	*Coba anda jelaskan kembali bagaimana Anda bisa membuat model matematika ini pada lembar jawaban yang Anda tulis kemarin?*
SI-W19	:	*Awalnya ada* $4\frac{2}{5}$ *gula pasir, kemudian* $\frac{1}{4}$ *digunakan jadi saya mengurangkan, lalu sisanya digunakan lagi* $\frac{2}{3}$ *untuk kue bolu dan 5 untuk botol minuman, Sehingga saya dapat membuat model matematika* $4\frac{2}{5} - \frac{1}{4} - \frac{2}{3} - 5$
P	:	*Coba Anda perhatikan kembali, menurut Anda apakah sudah cocok seperti itu?*
SI-W20	:	*Iya*
P	:	*Coba Anda perhatikan kalimat "Sebanyak* $\frac{1}{4}$ *digunakan untuk membuat pudding"apakah sudah cocok menggunakan operasi kurang atau menggunakan operasi perkalian untuk mencari berapa gula yang digunakan untuk membuat pudding?*
SI-W21	:	*Sudah cocok, karena sudah jelas yang digunakan untuk membuat pudding adalah Sebanyak* $\frac{1}{4}$

Transcript 30 shows that the subject was wrong in determining the mathematical model of the problem (SI-W19). This is because the student misinterpreted the problem into a mathematical form (SI-W21).

3) The stage of implementing the completion plan

The following is an excerpt from the SI interview related to figure 8 regarding the stages of implementing the settlement plan.

Transcript 31

P	:	*Lalu bagaimana langkah-langkah dalam menyelesaikannya?*
SI-W22	:	*Untuk penyelesaiannya sama seperti soal nomor 1, Dimana saya mengurangkan yang didepan terlebih dahulu kemudian mengurangkan yang bilangan pecahannya*
P	:	*Lalu bagaimana jika ada salah satu yang tidak mempunyai bilangan didepan atau bilangan bulat?*
SI-W23	:	*Mengubahnya menjadi pecahan biasa terlebih dahulu*
P	:	*Apakah Anda tahu cara mengubah pecahan campuran menjadi pecahan biasa?*
SI-W24	:	*Tidak tahu*

Transcript 31 shows that the subject considers that addition and subtraction of fractions are the same as the concept of addition and subtraction of whole numbers (SI-W22).

4) The stage of checking again

The following is an excerpt from the SI interview regarding figure 8 regarding the re-checking stage.

Transcript 32

P	:	*Kembali ke jawaban akhirnya, coba Andai simpulkan mengenai jawaban akhir yang Anda dapatkan*
SI-W25	:	*Jadi jawabannya adalah* $4\frac{4}{3}$
P	:	*Apa maksud dari jawaban itu?*
SI-W26	:	*….Saya tidak tahu*
P	:	*Apakah sebelum Anda mengumpulkan lembar jawaban, apakah Anda mengecek atau memeriksa jawaban Anda?*
SI-W27	:	*Tidak, saya langsung mengumpulkan*

Transcript 32 shows that the subject was unable to conclude from the final results obtained (SI-W26) and the subject did not recheck his work (SI-W27).

The problem-solving ability of fractional number arithmetic operations of idealistic personality type subjects based on the problem-solving ability indicators according to Polya's theory are understanding the problem, making a plan, implementing the plan, and re-checking the answer (Polya, 1973). The first step, understanding the problem, requires the solver to grasp the meaning of the problem fully, rephrase it in their own words, and identify the relevant information, including known data and what is being asked. According to Polya, without a clear understanding, problem-solving is hindered at every subsequent stage. Idealistic subjects were able to restate the problem in their own words, demonstrating a general understanding of the core concepts. However, their understanding was largely narrative, meaning they could paraphrase the question but lacked depth in identifying all mathematical relationships inherent in the problem. They were able to recognize what information was known (e.g., numbers and operations) and what was being asked, but they did not always distill this into the critical mathematical components required for solving the problem. This suggests that their understanding was surface-level, focused primarily on extracting facts from the problem's text without fully grasping the underlying mathematical concepts or operations required. This is by research conducted by Sutherland

that problem-solving skills, especially understanding problems, are still in the low category.

In the second step, making a plan, the students should think of various strategies or methods to approach the problem. This involves deciding how to translate the verbal problem into a mathematical model or equation. In Problem 1, idealistic personality-type subjects were able to successfully transform the verbal description into a mathematical model, demonstrating an understanding of how to set up equations based on the problem's requirements. However, in problem 2, they struggled to do the same, unable to convert the verbal problem into a workable mathematical model. This inconsistency highlights that while they may have the cognitive capacity to recognize mathematical relations, they failed to apply the same strategy effectively across different problem contexts. The failure to devise a mathematical model for Problem 2 suggests a lack of strategic flexibility, despite achieving success with Problem 1. This indicates that idealistic personality type subjects have a partial grasp of problem transformation but may struggle with adapting these strategies to new contexts (Giovanni, Parta, Susanto, & Anwar, 2023).

Implementing the plan requires the solver to follow through on the chosen method, solving the mathematical model step by step, and checking that each action adheres to the correct procedure. In this stage, idealistic subjects encountered significant challenges: Converting mixed fractions into improper fractions and vice versa was a consistent difficulty, they struggled to equate denominators when necessary, and could not adjust the numerators when the denominators were the same, and the operations of addition, subtraction, and division of fractions were generally beyond their capabilities, though they demonstrated a basic understanding of fraction multiplication. This pattern reveals a critical gap in their procedural understanding of basic fraction operations. While they could develop an initial model, they could not correctly perform the necessary mathematical manipulations. They were also unable to demonstrate the systematic application of the correct steps in solving problems, especially when it involved more than one operation or conversion (e.g., mixed fractions to improper fractions). According to Polya, effective implementation requires not just a correct plan but also the ability to follow through step by step. Idealistic students' errors in fraction operations indicate that although they may develop a plan, their execution is flawed. This highlights that while they understand the "what" (e.g., the steps involved),

they often do not know the how, leading to incorrect solutions (Saripudin & Sari, 2023). The speed at which they rush through calculations, without attention to detail, could be a contributing factor to these errors

The final step, "re-checking the answer," involves reviewing the solution to verify that it satisfies the conditions of the problem and that all steps have been carried out correctly. Idealistic subjects consistently failed to re-check their work, demonstrating several key limitations: they could not verify their results or draw conclusions about the validity of their solutions, they did not review the steps they took to ensure no errors were made, nor did they recheck their calculations. This failure to engage in self-correction aligns with Polya's idea that re-checking is vital for ensuring the correctness of the solution and the process. The absence of this step in idealistic students' problem-solving process suggests that they lack reflective skills that would enable them to catch mistakes before finalizing their answers. Polya views this final step as crucial for refining the problem-solving process. By not revisiting the solution, idealistic personality type subjects fail to learn from their mistakes and solidify their understanding of the problem. Re-checking could help them identify missteps in logic or errors in computation, leading to more accurate and reliable results. Even though the model is correct, the subject made mistakes in the solving steps so the final result is not correct. This is in line with the research results of Sari, Anggreni, and Mazlan (2021) that idealistic personality students cannot solve problems because there are mistakes in the solving process so the final result obtained is wrong. Idealistic personality type students tend to rush in working on problems so that they do not pay attention to the rights and wrongs of their work. Meanwhile, this is different from the research results of Nisa (2022) which stated that based on indicators of students' ability to solve mathematical problems according to Polya's theory, idealistic students have passed all indicators, namely understanding the problem, making a plan, solving the problem and rechecking the answer, but students do not do other ways to recheck the solution.

CONCLUSION

The results of this study indicate that: (1) The problem-solving ability of fractional arithmetic operations of Guardian personality type students is a) able to understand the problem, namely re-explaining the problem in their own words and identifying information about what is known and asked but

still in narrative form according to the question text, b) able to make a solution plan, namely being able to make a mathematical model of the problem but not yet in symbolic form, c) able to carry out the solution plan, namely solving the mathematical model with the correct steps, d) able to re-check, namely drawing conclusions and being able to re-check the steps written and calculations. Students of this type tend to read the problem repeatedly so that they can examine the problem better. Students of this type also have a strong memory and tend to think systematically and very carefully so that they can use various methods to prove that the answer they wrote is correct. 2) The problem-solving ability of fractional arithmetic operations of Artisan personality type students is a) able to understand the problem, namely re-explaining the problem in their own words and identifying information about what is known and asked but is still in narrative form according to the question text, b) able to make a solution plan but not optimally, namely being able to make a mathematical model for question 1 but not yet able to for question 2, the mathematical model is not yet in the form of symbols, c) unable to carry out the solution plan, namely solving the mathematical model with the wrong steps, d) unable to re-check, namely being unable to conclude and being unable to re-check the steps written and calculations. Students of this type are in a hurry to work, are not careful in interpreting the problem, and do not do in-depth analysis. 3) The problem-solving ability of fractional arithmetic operations of students with a Rational personality type is a) able to understand the problem, namely re-explaining the problem in their own words and identifying information about what is known and asked but is still in narrative form according to the question text, b) able to make a solution plan but not yet optimal, namely being able to make a mathematical model for question 1 but not yet able to for question 2, the mathematical model is not yet in the form of symbols, c) being able to carry out the solution plan, namely solving the mathematical model with the correct steps, d) being able to re-check, namely drawing conclusions and being able to re-check the steps written and calculations. Students of this type are less careful in observing the problem and do not pay attention to sentences that are traps that cause errors in making mathematical models. 4) The problem-solving ability of fractional arithmetic operations of students with the Idealist personality type is a) able to understand the problem, namely re-explaining the problem in their own words and identifying information about what is known and asked but is still in the form of a narrative according to the question text, b) able to make a

solution plan but not optimal, namely being able to make a mathematical model for question 1 but not yet able to do so for question 2, the mathematical model is not yet in the form of symbols, c) unable to carry out the solution plan, namely solving the mathematical model with the wrong steps, d) unable to re-check, namely being unable to conclude and being unable to re-check the steps written and calculations. Students of this type tend to be in a hurry in working on questions so that they do not pay attention to the right or wrong answers, are less careful in observing the problems and students forget the concept of fractions that have been learned because the previous learning did not make students understand the concept of fractions well.

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