International Journal of Humanities and Social Science Invention (IJHSSI)
ISSN (Online): 2319 – 7722, ISSN (Print): 2319 – 7714
www.ijhssi.org ||Volume 12 Issue 9 || September 2023 || PP. 71-80

Analysis of Metacognition Skills in Terms of Mathematical Resilience

Sri Mulyaningsih[1], Ipah Muzdalipah[2], Sinta Verawati Dewi[3]
[1] undergraduate student majoring in mathematics education at Siliwangi University
[2,3] Department of Mathematics Education, Siliwangi University
Corresponding Author: Sinta Verawati Dewi

ABSTRACT: *This study aims to investigate metacognition through mathematical resilience. Metacognition is the ability to understand and control the thinking process, while mathematical strength includes overcoming difficulties and staying motivated in solving mathematical problems. The method used was qualitative research with an explorative approach. Data was collected through mathematical resilience questionnaires, tests, and interviews. The research subjects were students of class VIII A at SMP Negeri 5 Tasikmalaya, selected based on the level of mathematical resilience identified: high, medium, and low. Data analysis was carried out with the reduction stages, data presentation, and conclusion drawing. The results showed that students with high resilience fulfilled the indicators of metacognition, including planning, monitoring, and assessment. Medium resilience students fulfilled planning and monitoring but had difficulty formulating conclusions and lacked confidence in the final answer. Low resilience students only fulfilled planning, had difficulty explaining information, and did not solve the problem. This research confirms the importance of mathematical resilience in developing students' metacognition in facing mathematical challenges. The implication is the need for learning that strengthens students' resilience and metacognition, helping to overcome barriers to learning mathematics.*
KEYWORDS: *Analysis; Metacognition Ability; Mathematical Resilience; Metacognition and Resilience; Relationship between Metacognition and Mathematical Resilience.*

Date of Submission: 26-08-2023 Date of Acceptance: 08-09-2023

I. INTRODUCTION

Mathematics has an important role in everyday life because it helps in solving various problems (Kusmaryono, 2014). Mathematics plays an important role in everyday life because it helps solve various problems. Mathematics can help students develop problem-solving skills and help develop cognitive skills and brain function. The problem-solving process involves a thinking process that needs to be controlled through awareness, called metacognition. Metacognition is the ability to regulate, organize, and monitor thinking processes in solving problems (Dewi, 2021). Dewi emphasizes that metacognition goes beyond mere thinking; it involves the higher-level ability to not only regulate and organize one's thinking processes but also to monitor them actively. This cognitive self-awareness enables individuals to scrutinize their problem-solving strategies, ensuring they are on the right track and adjusting when necessary. In essence, metacognition empowers individuals to be reflective problem solvers, enabling them to navigate challenges with a heightened understanding of their own cognitive approaches.

Metacognition is very relevant in solving math problems (Izzati & Mahmudi, 2018). Learners who are aware of their thinking processes can utilize metacognition to plan, monitor, and evaluate mathematical problem-solving. In other words, students who have an awareness of their thinking processes can utilize metacognition to develop planning strategies before starting to solve problems, monitor their progress during the problem-solving process, and evaluate the results of the solutions they find. Thus, students who use metacognition tend to be more skilled in solving mathematical problems because they can effectively manage and control their thinking processes. Metacognition is also related to mathematical resilience (Hutauruk et al., 2019), which is a positive attitude to not give up when facing difficulties in solving mathematical problems. Mathematical resilience refers to one's positive attitude of not giving up when facing difficulties in solving mathematical problems. In this context, metacognition can help learners develop self-belief and the ability to remain persistent and persevere when they face challenges in learning and solving mathematical problems.

Other opinions from several experts that support the importance of mathematical resilience and metacognition in learning mathematics include (Chytrỳ et al., 2020). The study found that metacognitive knowledge significantly affects school achievement in mathematics. Resilience in mathematics is also an important factor that can be developed through problem-based learning with a metacognitive approach. Learners with high mathematical resilience tend to be more successful in solving mathematics problems (Attami et al., 2020). The statement is strengthened by the reason that students who have high mathematical resilience generally have strong internal motivation to understand and solve mathematical problems. This motivation encourages them to keep learning and trying, even when they experience difficulties. In addition, they also tend to change learning methods if the initial strategy does not work.

However, the reality on the ground is that there are still many students who have not been able to solve mathematical problems, especially on the material of the system of linear equations of two variables. This inability indicates that students' metacognition skills are still weak. This is based on the lack of student experience in metacognition which, in terms of awareness of problem-solving strategies, is still stuck on one strategy without considering other alternatives. Although Curriculum 2013 emphasizes the importance of SPLDV learning in grade VIII mathematics, the facts on the ground show that there are still many students who experience difficulties in solving mathematical problems related to SPLDV. This indicates a gap in SPLDV learning recognized in Curriculum 2013, and one of the factors contributing to this difficulty is students' low metacognition skills.

Based on these facts, this study will analyze students' metacognition ability by considering their mathematical resilience. This research is important because there is no previous research that examines the relationship between metacognition ability and mathematical resilience. Therefore, this study is titled "Analysis of Metacognition Ability Given Mathematical Resilience" to explore the relationship between metacognition ability, mathematical resilience, and learners' ability to understand and solve mathematical problems related to SPLDV. Thus, this study will make an important contribution to our understanding of how aspects of metacognition and mathematical resilience can be interconnected and influence students' ability to overcome complex mathematical challenges such as SPLDV problems. The results of this study are expected to provide a more comprehensive view of how mathematics learning approaches can be tailored to enhance learners' metacognition and mathematical resilience, as well as bridge the gap in their understanding of higher mathematics concepts. Thus, this research will provide a strong foundation for the development of learning strategies that are more effective in developing both aspects simultaneously.

II. METHODOLOGY

This research uses qualitative methods. The initial survey was used to obtain data in the form of metacognitive abilities and resilience of junior high school students as the background of this study. Interviews conducted during the initial observation were conducted in a semi-structured manner with the mathematics teacher. The aim was to gather information about the problems in the school where the teacher teaches that have not yet found a solution, both in the cognitive, affective, and training material aspects. Semi-structured interviews were also conducted with three students who had different levels of mathematical resilience to analyze their understanding of how to solve the given problem and what strategies were used to help solve the problem. The research subjects were all students in class VIII of SMPN 5 Tasikmalaya. The sampling was done purposively (Creswell, 2014). Analysis of student resilience was obtained through questionnaires distributed, and 32 of them were answered and returned. The analysis of metacognitive ability was carried out through the student's work process in solving the problem of the Two-Variable Linear Equation System (SPLDV). Qualitative data analysis refers to (Moleong, 2017), consisting of data reduction, data presentation, and conclusion drawing.

III. DISCUSSION

This research underlines the importance of metacognition skills in terms of students' mathematical resilience. Mathematical resilience is a positive attitude to overcome anxiety and fear in facing challenges and difficulties in learning mathematics until finding a solution (Hutauruk & Priatna, 2017). Mathematical resilience is also closely related to the interaction between students and themselves (Dewi & Susanto, 2022) which plays an important role in developing mathematical resilience. Students who have good mathematical resilience tend to have a strong understanding of their abilities and limitations in mathematics. By interacting positively with themselves, they can more easily identify areas where they need to improve and plan strategies to overcome these difficulties. Mathematical resilience involves the ability not to feel too devastated by failures in understanding or solving mathematical problems. Through self-introspection, students can learn how to better deal with failure, see it as an opportunity to learn, and not take it as an indication of personal weakness. Students who interact positively with themselves tend to motivate themselves to keep trying to overcome mathematical obstacles. They can develop perseverance and give themselves support when facing difficulties.

In addition, it is important to understand that metacognition skills also play a role in strengthening students' interaction with themselves. By having a deeper understanding of how they think and learn, students can develop greater confidence in facing mathematical challenges. Thus, the relationship between metacognition ability and mathematical resilience not only enables students to overcome difficulties but also to develop personally in terms of self-understanding and confidence in their abilities in mathematics. Thus, this study highlights the importance of developing metacognitive ability in the context of mathematics education to support more effective learning and increase student resilience in dealing with difficult material. Metacognitive ability is the ability of students to control their cognitive abilities (Güner & Erbay, 2021). Students' success in learning is those who can manage their cognitive abilities. Metacognitive ability emphasizes planning, monitoring, and evaluating problem-solving activities. This research has a strong relevance because it links metacognitive ability and students' mathematical resilience. Aspects of metacognition that involve self-understanding of learning strategies and active problem-solving can provide a foundation for students to develop positive attitudes such as resilience. Through self-understanding of their thought processes, students can overcome anxiety and fear in facing mathematical challenges because they have the mental tools to overcome these difficulties. This approach provided by Hutauruk & Priatna (2017) provides an important perspective in understanding how metacognitive skills concretely contribute to mathematical resilience, leading to efforts to improve the effectiveness of mathematics learning and better mastery of the material. Metacognition ability was shown to be a significant predictor of students' mathematical resilience. This finding shows that students who have high metacognitive ability do not give up easily in solving the given mathematics problem and can even see the problem as an opportunity to learn rather than as an insurmountable obstacle.

Another important aspect analyzed from this study is the identification of adaptive metacognitive strategies used by students who have a high level of resilience. Students with high levels of resilience show a tendency to use strategies (Nota et al., 2004) such as self-monitoring and self-regulation while solving SPLDV problems. These strategies enable them to effectively navigate complex problem-solving scenarios, adapt their approach when faced with setbacks, and maintain a positive attitude towards mathematical challenges.

Some adaptive metacognitive strategies commonly used by students with high levels of resilience (Beer & Moneta, 2012) in the context of mathematics include: (a) Self-Monitoring. Students with high resilience tend to monitor their progress while working on SPLDV problems. They constantly check whether the process of working on the problem is as planned and whether there are any mistakes in the strategies they use. This allows them to identify problems quickly and take corrective measures. (b) Self-Regulation. Students with high resilience tend to be able to regulate themselves such as managing time and controlling negative feelings that arise when facing difficulties in solving problems. (c) Cognitive Flexibility. Students with a high level of resilience tend to be more flexible in thinking. They can easily change the solution strategy if the answer to the problem given has not been found. (d) Resource Utilisation. Students with high resilience tend to seek help (additional resources) when they feel difficult. They do not hesitate to ask teachers, or classmates, or look for additional references to understand concepts they find difficult. (e) Reflection. Students with high resilience tend to reflect on their learning experiences. They can identify what they have learned from previous experiences and how they can improve their performance in the future.

Mathematical resilience is divided into three categories: high, medium, and low (Fembriani et al., 2023). This categorization is a way to measure and describe the level of students' ability to deal with the mathematics problems given. This method can help teachers and researchers to better understand how students learn mathematics and the extent to which they are ready to face more complex mathematical challenges. The characteristics of resilience in the high category include having an attitude that does not give up easily, having self-confidence, having an open attitude, having confidence and ideas to solve problems until they get the best answer, being able to solve the problems faced to completion, and having high curiosity to solve problems. The characteristics of resilience in the moderate category include tending to be unstable in behavior, not being confident in their abilities, and having an up-and-down spirit. The spirit rises when starting something that can be done, and the spirit falls when losing motivation or making mistakes. The characteristics of resilience in the low category include having an attitude of giving up easily, not being able to solve problems, having no desire to socialize with peers, having no enthusiasm for learning, and no effort to be better than before.

IV. FINDINGS

Based on the questionnaire that has been distributed to class VIII students to determine the level of mathematical resilience, it is known that mathematical resilience is divided into three categories, namely high, medium, and low. The analysis of the questionnaire scores showed that there were 7 students with high mathematical resilience, 21 students with moderate mathematical resilience, and 4 students with low mathematical resilience. The representation of this information is stated in diagram 1 below.

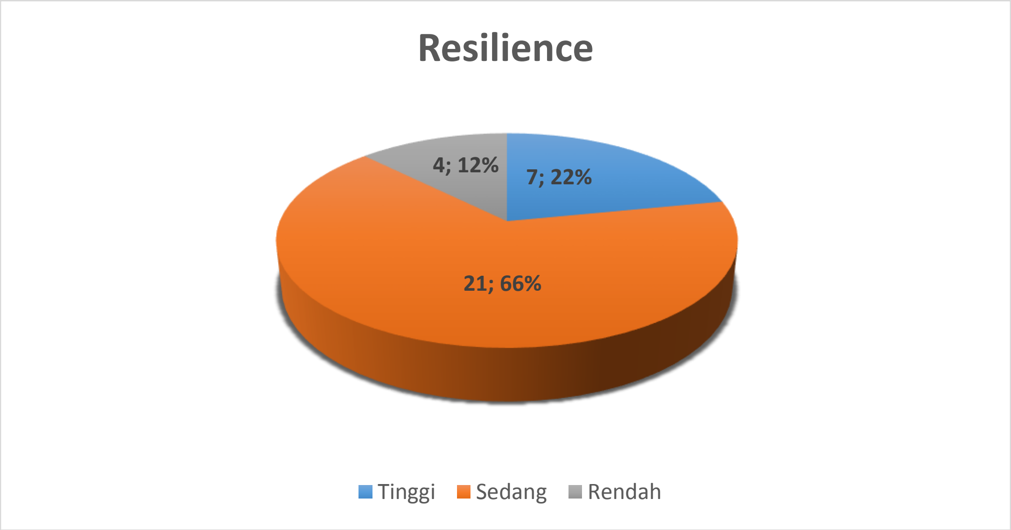

Figure 1: Mathematical Resilience of Junior High School Students

One of the seven students with high resilience was able to fulfill five characteristics of high mathematical resilience, namely never giving up, being confident, having an open attitude, having confidence and ideas to solve problems until they get the right answer, and having high curiosity about the teaching material and the problems are given. Three of the seven students who had high resilience were only able to fulfill four characteristics of high mathematical resilience, namely having an unyielding attitude, having self-confidence, having an open attitude, and being able to solve the problem until the end with the correct answer. The other three were only able to fulfill three characteristics of high mathematical resilience, namely unyielding, confident, and able to solve problems until the end. The subject that the researcher took from the high mathematical resilience category to be used as a respondent was S-08 because he was able to fulfill all five characteristics of high mathematical resilience.

One of the twenty-one students who had moderate resilience was able to fulfill two characteristics of moderate mathematical resilience, namely having an up-and-down spirit and not being confident in their abilities. Fluctuating morale here refers to fluctuations in students' emotions, motivation, or interest in mathematics. This means that students may experience varied feelings towards mathematics over time, sometimes feeling motivated and excited to learn, while at other times feeling less enthusiastic or frustrated. In addition, students also often equate the results of the answers they get to their neighbors even though the answers are correct. The remaining twenty students in the low category were only able to fulfill one feature of moderate mathematical resilience, namely fluctuations in students' emotions, motivation, or interest in mathematics. The subject that the researcher took from the moderate mathematical resilience category to be used as a respondent was S-26 because he was able to fulfill two characteristics of moderate mathematical resilience.

Three of the four students were only able to fulfill one characteristic of low mathematical resilience, namely no effort to be better than before. In other words, the three students made no effort to improve their mathematical understanding or skills over time. This can be a problem in learning mathematics as it is a subject that requires deep understanding and consistent practice. While the remaining person was able to fulfill the three low mathematical resilience namely the attitude of giving up easily, not being able to solve problems, and not having the enthusiasm to learn. The subject that the researcher took from the low mathematical resilience category to be used as a respondent was S-31 because it fulfilled 3 characteristics of low mathematical resilience.

After determining the respondents from each resilience category, the next step is to give problems related to the system of linear equations of two variables (SPLDV) to explore their metacognitive abilities.

1) Analysis of Metacognition Ability of S-08 with High Mathematical Resilience
   a) Planning Indicator
      S-08 on the planning indicator was able to write down what was known and asked in the problem and was able to write down the solution steps that would be used. The evidence of this ability is presented in Figure 2 below.

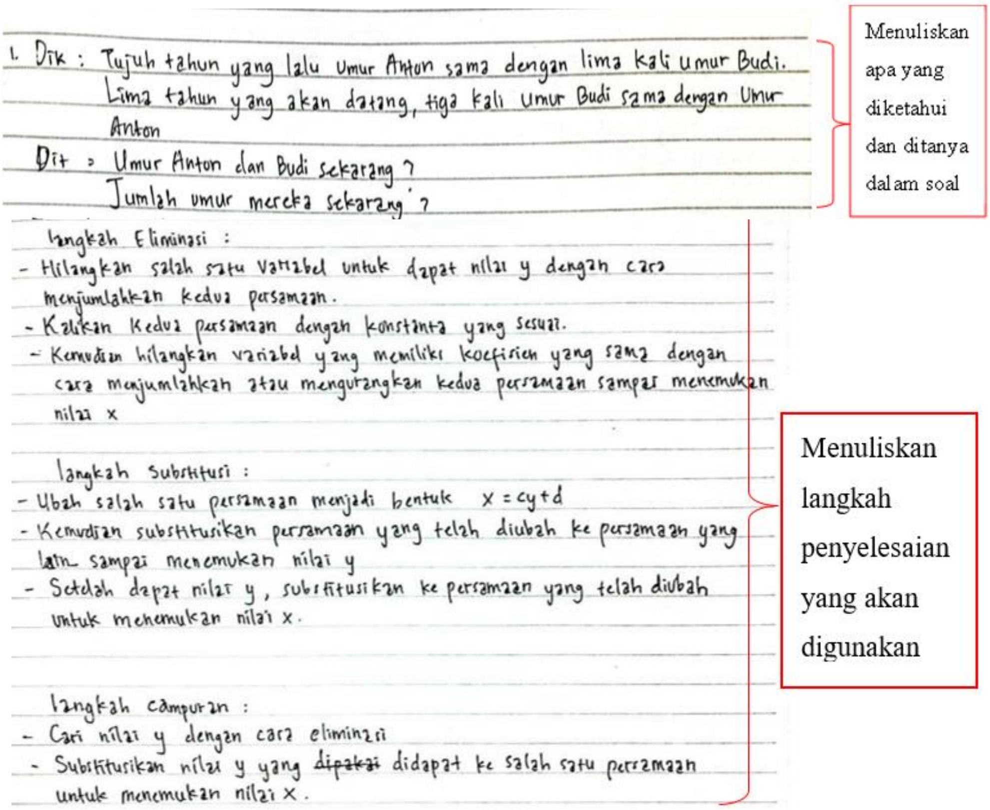

Figure 2. Result of S-08 Work on Planning Indicator

S-08 with a high resilience category has an extraordinary ability to overcome various learning challenges, and one important indicator of his metacognitive ability is the ability to plan. This ability is very relevant in the context of mathematics problem solving, especially in solving complex mathematics problems such as SPLDV (System of Linear Equations of Two Variables) problems. Planning in mathematics problem solving includes students' ability to organize their thoughts before they start solving the problem. Based on the results of the work, S-08 could start with clear steps, such as reading the problem carefully to understand what is known and asked in the problem. S-08 could identify the variables involved in the SPLDV problem and write them down neatly before going further in the problem-solving process. In addition, S-08 also had the advantage of writing the SPLDV problem-solving process systematically. S-08 was able to describe the steps they took to solve the problem clearly and logically. This included formulating relevant linear equations, using appropriate methods, and performing mathematical calculations accurately. Another important thing that S-08 managed to do was being able to follow the process of solving the problem until reaching the right final answer. S-08 did not only stop at the planning and formula generation stages but also continued to get the correct solution as requested in the SPLDV problem.

The researcher then conducted a semi-structured interview with S-08 about the reason for rewriting the known and questionable information that had been stated in the problem. Based on the results of the interview, it was known that S-08 deliberately wrote back the known and questioned things with the assumption that this attitude could help him understand the purpose of the problem and could also help plan the solution strategy to be used.

b) Monitoring Indicators

S-08 on the monitoring indicator was able to implement the solution steps and was able to make alternative solution strategies correctly. The evidence of this ability is presented in Figure 3 below.

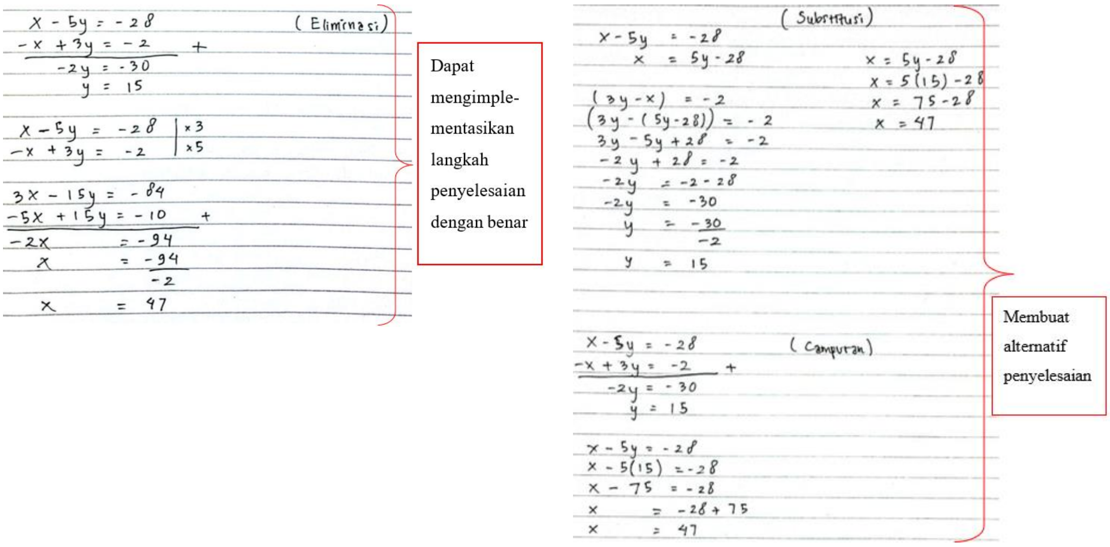

Figure 3. S-08 Work Result on Monitoring Indicator

S-08 was able to apply the predetermined strategy and use other strategies to emphasize that the results obtained through the elimination strategy also have the same results when other strategies are used such as substitution and mixture strategies. This ability is closely related to the second indicator of metacognitive ability, namely monitoring. This indicator involves self-monitoring of the understanding and execution of specific tasks which includes awareness of the steps they take during the problem-solving process. S-08 with a high resilience category has proven to be able to implement the steps needed to solve the SPLDV (System of Linear Equations of Two Variables) problem correctly. S-08 was able to check continuously whether the path he followed was correct and whether his calculations were consistent with the steps previously determined.

The researcher then conducted a semi-structured interview with S-08 regarding the reason for implementing the solution steps. Based on the results of the interview, it was known that S-08 implemented the solution steps after first determining the solution strategy so that the solution to the SPLDV question could be found.

c) Evaluating Indicator

S-08 in the third indicator, evaluating, was able to write the result of the given problem correctly and was also able to conclude the results of his work correctly. The evidence of this ability is presented in Figure 4 below.

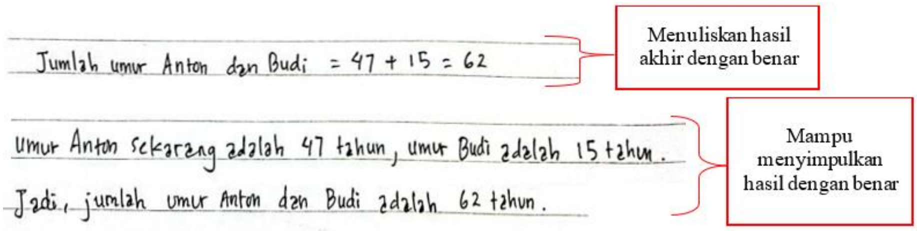

Figure 4. S-08's Work Result on Evaluating Indicator

One important aspect of metacognitive ability is the ability to evaluate work. This third indicator of metacognitive ability called "evaluating," is very important in the learning process. Based on Figure 4, it is known that S-08 was able to write the result of the given problem correctly. This is one of the signs that S-08 has a high level of resilience in metacognitive ability. In addition, S-08 with the high resilience category also could make the right conclusion from the SPLDV problem that had been done. This means that S-08 was not only able to answer the problem correctly but also able to interpret the results in a broader context. S-08 was able to identify patterns or relationships that might arise from the solutions found, and this shows a deeper understanding of the material.

The researcher then conducted a semi-structured interview with S-08 regarding the reason for writing the conclusion at the end of the answer. Based on the results of the interview, it was found that the reason why S-08 wrote the conclusion was as a form of information processing and confirmation of his understanding of SPLDV material, not just answering the question without understanding the purpose of the question.

Figure 5. Researcher interview session with S-08

2) Analysis of Metacognitive Ability of S-26 with Moderate Mathematical Resilience
   a) Planning Indicator
      S-26 on the planning indicator was able to write down what was known and asked in the problem, although in writing it was not able to write down the solution steps to be used, but in the interview, it was able to determine the strategy used to solve the SPLDV problem. Evidence of this ability is presented in Figure 6 below.

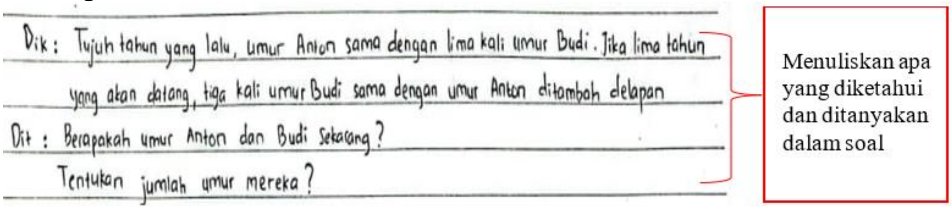

Figure 6. The results of S-26's work on the Planning Indicator

Based on the picture above, it is known that S-26 was able to write clearly what was known and what was asked in the problem about SPLDV. However, he did not write down the strategy he would use to solve the problem. In this case, S-26 is still considered able to fulfill the first indicator of metacognitive ability, namely planning. To find out the reason for not writing down the strategy in the work, the researcher conducted an unstructured interview with S-26. The results of the interview showed that S-26 had to race with limited time, so she had to find a solution immediately without having to waste time writing down the strategy in detail. In addition, S-26 was able to verbally mention the correct strategies that can be used to solve SPLDV problems, namely elimination, graphing, and substitution. This means that this planning indicator can be fulfilled well even though there are aspects that are not explained in writing.

   b) Monitoring Indicator
      S-26 on the monitoring indicator was able to implement the solution steps of the SPLDV problem correctly. The evidence of this ability is presented in Figure 7 below.

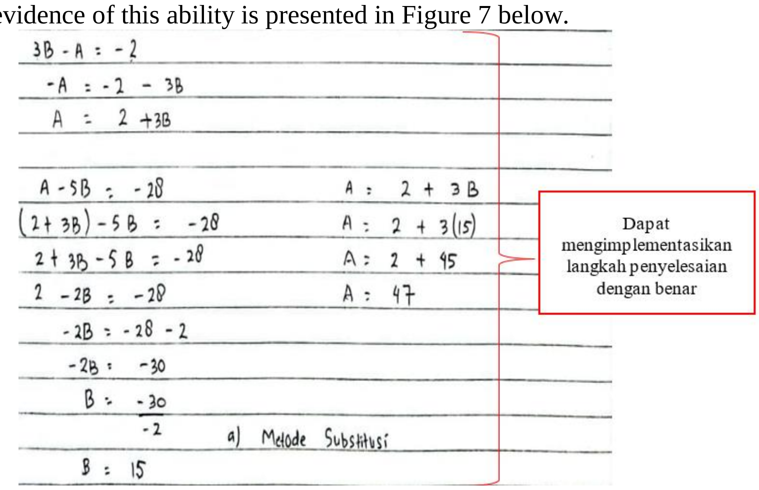

Figure 7. S-26's Work Result on Monitoring Indicator

The research subject with the initials S-26, who has a moderate level of mathematical resilience, can effectively apply the solution steps for SPLDV problems correctly. In other words, this subject was able to maintain a good understanding of the basic concepts of mathematics in solving SPLDV problems. He was also able to identify the most effective thinking strategy to solve the problem by understanding the steps needed to reach the solution he considered appropriate.

The researcher then conducted a semi-structured interview with S-26 regarding the reason for implementing the solution steps, and the reason for only one strategy used. Based on the results of the interview, it is known that S-26 was unable to guess or imagine the solution without processing through calculations based on the strategy he had chosen, namely the substitution strategy. As for the strategy used, S-26 stated that he was used to using the substitution strategy in working on SPLDV problems, so he was more confident in using the method than other methods.

c) Evaluating Indicator

In the third indicator, evaluating, S-26 was able to write the result of the given problem correctly. The evidence of this ability is presented in Figure 8 below.

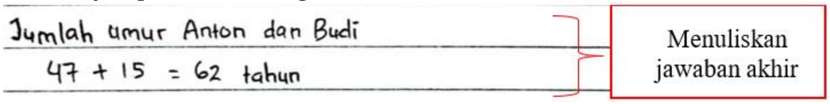

Figure 8. S-26's Work Result on Evaluating Indicator

S-26 was more proficient in using the substitution method in solving the SPLDV problem that the researcher gave and could easily determine the sum of the ages of Anton and Budi which is 62 years. The researcher then conducted a semi-structured interview with S-26 about the reason for writing the final answer to the problem. The results of the interview showed that S-26 wrote the final answer because he understood the point that should be sought from the given problem, not finding the age of Anton and Budi, but finding the sum of the ages of Anton and Budi. The researcher interpreted S-26's answer as a form of student understanding of the SPLDV concept. Writing down the final answer can help S-26 reflect on whether the result is correct or incorrect. When the researcher asked about the validity of the final answer, S-26 answered that the validity can be detected by subtracting the total age of the two from one of the ages of the two, for example, $62 - 47 = 15$. So, the final answer written is valid. The researcher also asked about the conclusion that S-26 was not included in her work. S-26 stated that she only focused on how to get the correct numerical answer or result, so she did not pay much attention to making or writing the conclusion.

Figure 9. Researcher interview session with S-26

3) Analysis of Metacognition Ability of S-31 with Low Mathematical Resilience

a) Planning Indicator

S-31 on the planning indicator was only able to write down what was known and asked in the problem, without being able to write down what strategy would be used to solve the SPLDV problem. Evidence of this ability is presented in Figure 10 below.

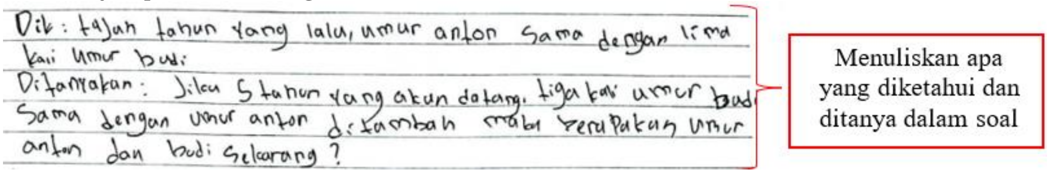

Figure 10: The results of S-31's work on the Planning Indicator

In the planning aspect, S-31 did not seem to describe the plan or strategy that would be used to solve the problems given. From the interview conducted with the researcher, it was revealed that S-31's understanding of the SPLDV concept was limited, and he had difficulty finding an appropriate strategy to answer the problems. Although S-31 had previously tried to practice with SPLDV story problems, the results were still far from expectations. What makes this subject interesting and unique is his lack of a strong desire to learn. S-31 rarely actively asked questions to peers or the subject teacher, which should have been one of the ways to improve his understanding. This may be a challenge in his learning process.

b) Monitoring Indicator

S-31 faced serious challenges in his metacognitive skills, which were reflected in his level of mathematical resilience. The level of mathematical resilience reflects a person's ability to face, understand, and solve mathematical problems well. In this case, S-31 experienced significant difficulties in several important aspects, including difficulties in implementing the solution steps and creating alternatives from different strategies, which also includes the second metacognitive ability indicator.

When S-31 is unable to plan a solution strategy, it will lead to difficulties in implementing the steps that have been formulated and will have difficulty in finding the answer to the given problem. Errors in implementing the solution steps could include miscalculations, inability to carry out the necessary mathematical operations appropriately, or other technical errors. In this case, S-31 requires special attention and assistance in understanding basic mathematical concepts, and more intensive training to improve his mathematical resilience.

Figure 11. Researcher interview session with S-31

The Impact of Metacognition Skills in Terms of Mathematical Resilience

Based on the findings of this study, researchers identified several impacts, including:

1. Increased Metacognitive Awareness. The results showed that students with high mathematical resilience were able to fulfill all indicators of metacognitive ability well. From this, it can be concluded that improving students' mathematical resilience can help them become more aware of their thinking processes. This has a positive impact on their ability to tackle more complex mathematical challenges.
2. The Importance of Emotional Factors in Math's Learning. The finding that students with moderate mathematical resilience were only able to fulfill some indicators of metacognitive ability suggests that emotional factors such as lack of confidence in one's abilities also play an important role in mathematics learning. This shows the importance of paying attention to students' psychological aspects to improve their metacognition skills.
3. The importance of support for Students with Low mathematical Resilience. The results showed that students with low mathematical resilience were unable to fulfill the indicators of metacognition skills. There may be a need for special interventions or training programs to help students with low levels of mathematical resilience develop their metacognition skills.
4. Improvement of Learning Strategies. This study can also provide insights to educators and researchers on the importance of integrating metacognition training in the mathematics curriculum. This can help students develop the ability to monitor and control their understanding of mathematics, regardless of their level of mathematical resilience.

Thus, the results of this study underscore the importance of understanding the relationship between mathematical resilience and students' metacognition abilities in the context of mathematics education, with the goal of improving the quality of learning and students' mathematics achievement.

V. CONCLUSION

Based on the results of the research and discussion regarding the analysis of metacognition skills in terms of mathematical resilience, it can be concluded that: (1) The metacognition ability of S-08 who has high mathematical resilience has fulfilled the indicators of planning, monitoring, and assessment. This shows that S-08 can plan the right steps, monitor progress during the process of solving mathematics problems, and assess the results well. (2) The metacognitive ability of S-26 who had moderate mathematical resilience only fulfilled the planning and monitoring indicators. Although S-26 was able to plan and monitor his work, on the assessment indicator, S-26 had difficulty. S-26 could write down the final answer but was unable to write down the conclusion and was also unsure of the final answer. This shows that S-26 needs to improve her evaluation skills. (3) The metacognitive ability of S-31 who has low mathematical resilience only fulfills the planning indicator. S-31 could plan what was known and asked in the maths problem but was unable to solve the problem until he found the final answer. Therefore, S-31 was unable to fulfill the monitoring and assessment indicators. This shows that S-31 needs to develop the ability to solve math problems effectively. Based on the findings, it appears that mathematical resilience affects metacognition skills in planning, monitoring, and assessing the SPLDV problem-solving process. Students with high mathematical resilience tend to have better metacognition skills than students with low mathematical resilience.

REFERENCES

[1] Attami, D., Budiyono, & Indriati, D. (2020). Mathematical resilience and mathematical problem-solving ability in Junior High School. Journal of Physics: Conference Series, 1613(1), 012028. https://doi.org/10.1088/1742-6596/1613/1/012028

[2] Beer, N., & Moneta, G. B. (2012). Adaptive metacognitive self-regulation and functional resilience-related assets in the midst of challenging tasks: A qualitative analysis. In V. Barkoukis (Ed.), Psychology of Self-Regulation, 1–36.

[3] Chytrỳ, V., Říčan, J., Eisenmann, P., & Medová, J. (2020). Metacognitive knowledge and mathematical intelligence-Two significant factors influencing school performance. Mathematics, 8(6). https://doi.org/10.3390/MATH8060969

[4] Creswell, J. W. (2014). Research-Design_Qualitative-Quantitative-and-Mixed-Methods-Approaches (V. Knight, J. Young, K. Koscielak, B. Bauhaus, M. Markanich, & A. Hutchinson, Eds.; 4th ed.). SAGE Publications, Inc.

[5] Dewi, S. V. (2021). Pengembangan model pembelajaran berbasis metacognitive questions (mq) untuk mendukung keterampilan problem posing Mahasiswa calon Guru. REPOSITORI UNIVERSITAS NEGERI MALANG.

[6] Dewi, S. V., & Susanto, A. (2022). Learner-self interaction siswa sekolah dasar dalam menyelesaikan soal matematika terbuka. Journal of Authentic Research on Mathematics Education (JARME), 4(1), 1–13. https://doi.org/10.37058/jarme.v4i1.3835

[7] Fembriani, Munawir, Y., & Subagya. (2023). Analysis of mathematical literacy based on mathematical resilience of fifth grade elementary school students. Jurnal Pendidikan Dasar Nusantara, 8(2). https://doi.org/10.29407/jpdn

[8] Güner, P., & Erbay, H. N. (2021). Metacognitive Skills and Problem-Solving. International Journal of Research in Education and Science, 715–734. https://doi.org/10.46328/ijres.1594

[9] Hutauruk, A. J. B., Darmayasa, J. B., & Priatna, N. (2019). Achievement of students mathematical resilience through problem based learning model with metacognitive approach. Journal of Physics: Conference Series, 1315(1). https://doi.org/10.1088/1742-6596/1315/1/012051

[10] Hutauruk, A. J. B., & Priatna, N. (2017). Mathematical Resilience of Mathematics Education Students. Journal of Physics: Conference Series, 895(1). https://doi.org/10.1088/1742-6596/895/1/012067

[11] Izzati, L. R., & Mahmudi, A. (2018). The influence of metacognition in mathematical problem solving. Journal of Physics: Conference Series, 1097(1). https://doi.org/10.1088/1742-6596/1097/1/012107

[12] Kusmaryono, I. (2014). The importance of mathematical power in mathematics learning. International Conference on Mathematics, Science, and Education (ICMSE), 35–40.

[13] Moleong, L. J. (2017). Metode Penelitian Kualitatif (36th ed.). PT REMAJA ROSDAKARYA.

[14] Nota, L., Soresi, S., & Zimmerman, B. J. (2004). Self-regulation and academic achievement and resilience: A longitudinal study. International Journal of Educational Research, 41(3), 198–215. https://doi.org/10.1016/j.ijer.2005.07.001