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Exploration of Students' Metacognition in Collaborative Mathematical Problem Solving

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Abstract: This study is a qualitative descriptive study that aims to describe students' metacognitive exploration of collaborative problem-solving. This study involved three students with high, medium, and low mathematical abilities who would work together in a group to solve a mathematical problem. The instruments used were an initial ability test, a mathematical collaborative problem-solving test, an observation sheet, and an interview guide. Data collection methods were through assignments, observations, and interviews. The results showed that during the planning activity, a low-ability student had difficulty planning the stages of problem-solving, but with the help of two friends, he managed to understand how to solve the problem. During the monitoring activity, high and medium students worked together to improve their understanding after seeing the low-ability students struggling. During the evaluating activity, low, medium, and high students did not provide feedback to each other because they did not realize that feedback was necessary. Therefore, it can be concluded that individual metacognitive activities play an active role in the group metacognitive process in solving collaborative problems.

Keywords: Exploration; Metacognition; Collaborative Problem Solving

Abstrak: Penelitian ini adalah penelitian deskriptif kualitatif yang bertujuan untuk menggambarkan hasil eksplorasi metakognisi siswa terhadap pemecahan masalah kolaboratif. Penelitian ini melibatkan 3 orang siswa yang memiliki kemampuan matematika tinggi, sedang dan rendah yang akan bekerja sama dalam satu kelompok untuk memecahkan masalah matematika. Instrumen yang digunakan Adalah tes kemampuan awal, tes pemecahan masalah kolaboratif matematis, lembar observasi dan pedoman wawancara. Metode pengumpulan datanya melalui tugas, pengamatan dan wawancara. Hasil penelitian menunjukkan pada aktivitas *planning* siswa rendah kesulitan untuk merencanakan tahapan penyelesaian masalah namun berkat bantuan dari dua temannya ia berhasil memahami cara menyelesaikan masalah. Pada aktivitas *monitoring* siswa tinggi dan sedang melakukan perbaikan pemahaman bersama setelah melihat siswa rendah kesulitan. Dan pada aktivitas *evaluating*, siswa rendah, sedang dan tinggi tidak memberikan umpan balik kepada satu-sama lain karena tidak menyadari bahwa perlu untuk memberikan umpan balik. Sehingga dapat disimpulkan bahwa aktivitas metakognisi individu berperan aktif dalam proses metakognisi kelompok dalam memecahkan masalah kolaboratif

Kata Kunci: Eksplorasi; Metakognisi; Pemecahan Masalah Kolaboratif

INTRODUCTION

Problem-solving is an essential part of mathematical learning. Learning outcomes, also known as *Capaian Pembelajaran* (CP), designed into the Indonesian curriculum include developing thinking skills and using mathematical knowledge to solve everyday problems (Kemendikbudristek, 2024). The statement shows that

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Indonesia is well aware of the importance of problem-solving skills for students. When students have been able to solve problems, they can use any approach they can think of, use every piece of knowledge they have learned, and justify their ideas in ways they believe (NCTM, 2010). Problem-solving is the ability of students to understand a problem, plan its solution, implement the chosen strategy, and review the problem's resolution to systematically determine a solution, which is closely connected to the appropriate representation of the problem (Siagian et al., 2019).

Baroody in Suryaningtyas & Setyaningrum (2020) stated that several aspects influence students' mathematical problem-solving abilities, including: (1) cognitive aspects, which encompass conceptual knowledge, understanding, and strategies to apply that knowledge; (2) affective aspects, which influence students' tendencies to solve problems; (3) metacognitive aspects, which enable students to regulate their own thinking. This statement aligns with Güner and Erbay (2021), who stated that metacognition is very important in problem-solving because it can help students carry out the steps of mathematical problem-solving and manage the process. Students with intense metacognition are expected to make responsive, logical, and systematic decisions by considering various perspectives (Safitri et al., 2020). Students who can apply metacognition can evaluate and choose the right approach to solving problems, which, in turn, enhances their ability to solve mathematical and other academic problems.

Metacognition is derived from a combination of two words, namely "meta" and "cognition". "meta" comes from Greek, meaning "after" or "beyond." In contrast, "cognition" comes from the Latin "cognoscere," which means "to know" or "to recognize" (Wulandari et al., 2019). The term metacognition was first introduced as the ability to think about thinking, to understand, monitor, and reflect on one's own thinking, and to consider the assumptions and implications of one's activities (Flavell, 1979). Metacognition can be defined as a person's awareness and understanding of their own thinking processes, as well as the ability to control and regulate these processes (Murtadho, 2020). Based on these definitions, it can be concluded that metacognition is a mental activity in which a person is aware of their own thinking process so they can control it.

Since 2013, learning in Indonesia has been driven by a student-centered approach (Indah et al., 2020). It led to the frequent use of group learning models. Group learning models prioritize student discussion and interaction. The interactions that occur during discussions are not only cognitive but also involve metacognitive processes (Firmansyah et al., 2025). This statement is also in line with Çini et al. (2023), who stated that when students work in groups, they will activate their metacognition. For example, each student will evaluate their own ideas and each group member through task processing, State their way of thinking about solving the problem, review each idea using information provided by the problem or by other group members, and monitor their thoughts based on feedback. This statement aligns with collaborative problem-solving, which is the ability of two or more students in a learning process to effectively combine their efforts, skills, and knowledge to solve problems (OECD, 2019).

Graesser et al. (2017) state that collaborative problem-solving is an essential skill at home, in the workplace, and in society because much of the planning, problem-solving, and decision-making in the modern world is done by teams. In

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collaborative problem-solving, student interaction is highly beneficial because students rely on one another and work together as a team to achieve shared success. A team's success in solving problems can be facilitated by strong team members who can draw on diverse perspectives, help negotiate conflicts, assign roles, promote team communication, and guide the team through challenging obstacles.

In-depth research on student metacognition in collaborative problem-solving has been conducted by Dindar et al. (2020), who demonstrated an interdependent relationship between metacognitive experiences and collaborative problem-solving. However, this study did not detail the metacognitive processes students experienced in group problem-solving. In addition, a similar study was conducted by Goos & Galbraith (1996). This study aims to determine the metacognitive strategies used by pairs of high school students working together to solve problems. However, this study does not explain whether the group is homogeneous or heterogeneous.

There has been no research on the metacognitive processes of middle school students during collaborative problem-solving in groups of 3. Therefore, the researcher seeks to explorate the metacognitive processes of middle school students in collaborative mathematical problem-solving. By understanding students' metacognitive activities during collaborative problem solving, teachers can design effective group learning and address problems that arise when students collaborate by considering these activities.

RESEARCH METHOD

This research is a qualitative study with a case study approach. According to Rahardjo in Ridlo (2023), case study research is a series of scientific activities conducted in depth and detail on a program, event, or activity, at the individual, group, institutional, or organizational level, to gain in-depth knowledge of the event. An in-depth exploration of students' metacognition was conducted in one group. The group's results were explored through in-depth interviews. All activities carried out by students, from initial ability tests and collaborative problem-solving to interviews, were recorded. The collected data were used to describe students' metacognition.

This research was conducted at MTsN Gresik. The informants were selected from among 33 grade 8-A students in May 2025. Subject selection was conducted using Stratified Purposive Sampling. According to Siswono (2019), Stratified Purposive Sampling is a sampling technique that considers specific criteria or objectives to form subgroups that facilitate comparison. In this method, researchers select respondents based on characteristics relevant to the research objectives, rather than randomly. Purposive sampling falls under non-probability sampling, in which not all members of the population have an equal chance of being selected into the sample. In this study, the selected subjects had received material on linear equations. All students were given an initial ability test and categorized into three categories: high, medium, and low. These students were then grouped into heterogeneous groups of three. In this study, groups were created consisting of students with abilities of High-Medium-Low (HML), High-Low-Low (HLL), Medium-Medium-Low (MML), and High-Medium-Medium (HMM).

The primary instrument in this study was the researcher. The researcher's role as an instrument is to serve as a data-collection tool that cannot be delegated. As the primary instrument, the researcher collected data using various techniques, including

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interviews, observation, and documentation. This process requires expertise to obtain in-depth and relevant information from respondents (Abubakar, 2021). In addition, several supporting instruments were used, including a student baseline ability test, a two-item collaborative problem-solving test, and an interview guide.

Data collection begins with an initial ability test for all students. Based on the test results, students will be grouped into high, medium, and low ability. Next, students with good communication skills are selected so they can discuss and undergo an interview. The selected students are then placed into High-Medium-Low (HML), High-Medium-Medium (HMM), High-Low-Low (HLL), and Medium-Medium-Low (MML) groups. Each group is then given two problem-solving tests to complete together. After the tests are completed, each group will be interviewed in a focus group discussion (FGD).

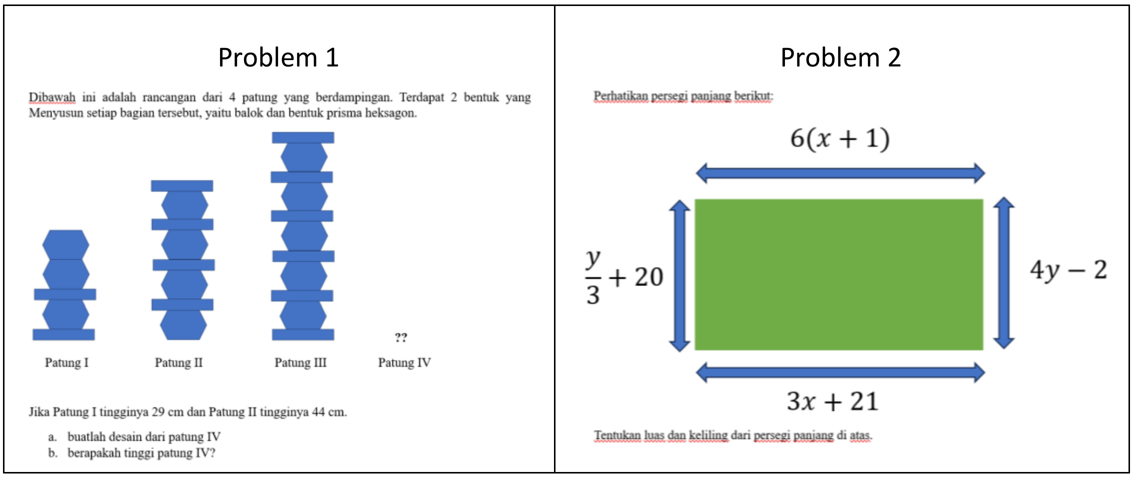

Figure 1. Collaborative problem solving test

The results of observations and interviews were then analyzed using collaborative problem-solving indicators by (OECD, 2013) and metacognitive process indicators by Güner & Erbay (2021) and Sutama et al. (2021).

RESULT AND DISCUSSION

During the planning activity, each student in the HML group understood their own and their teammates' mathematical abilities from the moment the group was formed. Interviews revealed that students with high and medium abilities acknowledged the need to understand their teammates' abilities to allocate roles, while students with low abilities used this awareness to position themselves and maximize their roles within the group. The HML group also recognized from the outset that solving the assigned problems required interaction among members to facilitate faster resolution and that this interaction would foster mutual support. Because the purpose of this interaction was to help each other, the HML group recognized the need to assign roles.

Initially, the HML group did not discuss what was known and what was being asked, but low-ability students struggled to understand the meaning of the problems. Therefore, students with medium and high abilities assisted them, indirectly leading to a shared understanding of what was known, what was being asked, and what needed to be done. The HML group understood their own roles and

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clarified the roles of other team members. Although the assignments were not formal, each member was able to explain their roles and how they carried out their tasks. In Problem I, the medium-ability student had a better grasp of the material. When they found a solution and shared it with their groupmates, both the medium and low-ability students agreed. In solving Problem I, the medium-ability student was assisted by the high-ability student. The low-ability student merely observed and attempted to understand the discussion between the two students. In Problem II, the high-ability student first discovered a solution, taking on the role of solving Problem II, assisted by the medium-ability student. When encountering difficulties in solving Problem II, the low-ability student attempted to provide solutions that led to the solution. From this, the high-ability and low-ability students acted as conceptualizers and executors. Meanwhile, the low-ability students, who already understood their abilities, continued to provide maximum assistance and tried to understand. Because the division was not formalized at the beginning, each student in the group did not know their role. However, as time went on, new students began to understand their roles. In Problems I and II, the medium-ability and high-ability students explained their reasons for choosing the problem-solving stages, and, when interviewed, the low-ability students also explained their reasons for choosing these stages.

All three students in the HML group demonstrated good integration in their roles in solving both problems. So, once they knew their respective roles, each student tried to get involved in solving the Problem. While the problem-solving process was underway, students did not realize they needed to refine their collective understanding, but as their peers worked, they monitored their peers' work. After completing the Problem, the HML group realized they needed to check their work. The plan was to use a tracer approach, allowing students to trace each step they had taken and verify its accuracy. After checking the problem solution, the high-stakes students re-explained it to the low-stakes students to ensure they understood their work. The answer sheets were then collected. This meant that students did not realize they needed to provide feedback at the end of the group.

In the planning activity, the three students became aware of their own mathematical abilities and those of their group members. Students with high and medium abilities admitted they needed to know their group mates' abilities to determine role assignments, while students with low abilities used this awareness to position themselves and maximize their roles in the group. The statement aligns with the findings of Rizqiani dan Hayuhantika (2019), who showed that students with high, medium, and low abilities were all aware of their abilities. In addition to being aware of their own abilities, the three students understood their groupmates' mathematical abilities. This is consistent with Jones et al. (2012), who found that students can understand their friends' behavior, abilities, and academic concepts. Other activities included the three students realizing the need to interact with each other to solve problems, divide roles, and discuss and align on what is known, what is asked, and what plans will be carried out. Understanding that one of their group members, a low-ability student, was having difficulty understanding the problem presented, the medium- and low-ability students helped by providing explanations and ensuring the student understood the problem and the plan to be carried out. After discussing the plan, each student in this group recognized their roles and responsibilities, the need for monitoring, and the need to evaluate the success of the

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problem-solving process. However, this group failed to recognize the need to provide feedback to group members after the problem-solving process.

In the monitoring activity, students were able to explain their perspectives on their abilities and those of their group members, based on their daily mathematics learning experiences. Students in the HML group also explained that the interaction used in problem-solving was discussion. The HML group spontaneously divided roles. For Problem 1, the average-ability student came up with the solution, and to expedite it, the average student also wrote it down. The low- and high-ability students helped calculate and monitor each step. For Problem 2, the high-ability student came up with the solution, but because they were already seated in the middle, the average-ability student returned to write it down. All HML groups also shared a similar understanding of the known and questioned questions in the problem, indicating that they conducted discussions to find common ground.

The HML group, particularly the medium-ability students tasked with writing, recognized progress in problem-solving by considering the results of the steps taken. The HML group also recognized the roles of each member: the high-ability and medium-ability students acted as concept designers; the students wrote the solutions; the high-ability students monitored the work of the medium-ability students; and the low-ability students monitored while trying to understand the work of their two peers. In solving problem II, the low-ability students contributed ideas on how to proceed, a process that the medium and medium-ability students debated. This demonstrated good collaboration among students in the HML group.

The division of tasks was spontaneous, so the video of the work showed no communication among members about the actions being taken or to be taken. Students worked according to the agreement made at the outset. The group also made predictions about the results of the work. Students in the HML group also explained their involvement in the problem-solving process.

The monitoring process in problem-solving was carried out predominantly by high-ability and low-ability students. High-ability students also recalculated in their heads to check the work written by students with average ability. Meanwhile, low-ability students attempted to match their peers' steps with the initial plan they had previously developed.

Evaluation and prediction of success were conducted by tracing the work done after both problems were completed. This tracing involved comparing each step of the problem-solving process with the results obtained in the next step. This matching process continued until the final result was obtained. Because the final result matched the tracing results and the scores were unanimous, students felt confident that the problem had been successfully solved. However, feedback and role adjustments within the group were not provided. Students were unaware of the need for feedback after the group problem-solving process. Furthermore, the spontaneous assignment of roles also led to the lack of role adjustments within the group.

In the monitoring activity, the three students explained that their perspective on students' mathematical abilities came from observing the daily lives of students and their group members in class. This aligns with research by Jones et al. (2012), which showed that students understand their friends' behavior, abilities, and academic concepts through their daily interactions in class. The three students were also able to determine the steps for solving, make predictions from these steps, and

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carry out role division. Students determine the steps for solving, with one student providing an idea along with the reasoning, and then discussing it together. This statement is in accordance with research conducted by Leikin & Zaslavsky (1997). Although the role division was done spontaneously, each student tried to be actively involved and contributed to the problem-solving process. In addition, the three students also monitored and evaluated each step of the problem-solving process and the results obtained. This shows that students also created and answered their own questions about the success of the problem-solving process.

In the Evaluation activity, students assessed that their perspectives on their own abilities and those of other group members were appropriate, based on their daily math activities. Students also assessed that the interaction was effective, with students who had ideas writing down their solutions, resulting in faster problem-solving, while other students monitored. The division of tasks was also deemed fair and effective, with the advantage of being faster than if tasks were divided equally.

The HML group discussed aligning perceptions regarding what was known, what was asked, and what needed to be done. After the discussion and assessing that the ideas presented were reasonable, the HML group immediately implemented them. Thus, the HML group assessed the validity of the common ground (what was known, what was asked, and what needed to be done). Because high- and low-ability students were monitored separately, the HML group also assessed the work done by students with moderate abilities. In the group interviews, the HMLs also assessed each other’s work and collaboration.

The HML group also found no communication difficulties. Although differences of opinion were evident in the Problem II problem-solving video, the HML group was able to overcome these obstacles. Students in the HML group also evaluated their peers’ proposed plans. As in Problem I, after the average student explained how to solve the Problem, they evaluated the proposed idea. They agreed with it, arguing that it was reasonable and appropriate for the type of Problem. Each student in this group also participated in the problem-solving process, completing their own tasks without asking others for help. In interviews, both high- and average-performing students assessed their work as optimal, but low-performing students felt they were not contributing effectively. Each group also assessed its peers' involvement.

High students also assessed their monitoring results by comparing them with the work of average students. Because the results were similar, the average students’ work was consistent with their calculations and their shared understanding of the initial plan. After evaluating each stage and step, and finding a match, the HML group deemed their work correct. The HML group did not provide feedback during or after the problem-solving process. Therefore, they also did not assess the feedback results.

In the evaluation activity, the three students assessed the perspectives they created, their interactions, communication, role assignments, and the tasks they performed. Then, the three students also assessed the results of their solutions. High- and medium-ability students checked their results by tracing the steps, testing the solutions, and matching them to the questions. In contrast, low-ability students checked the appropriateness of the steps used against the agreed-upon steps. This

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aligns with research by Rizqiani & Hayuhantika (2019), which showed that low-ability students did not test solutions, while high- and medium-ability students did.

In collaborative problem-solving, high- and medium-ability students act as conceptors. The initiator is the student who has mastered the material for the given problem. Low-ability students can also act as conceptors if the problem relates to material they understand.

CONCLUSION

In the planning activity, the HML group is aware of the abilities of themselves and other group members, aware of the need to interact, divide roles, align perceptions about what is known, asked and how to solve, explain the tasks obtained, understand their roles and other group members, know what will and is being done, explain the stages of the plan to be carried out, the involvement plan, how to monitor and improve shared understanding and how to evaluate the success of problem solving. In the monitoring activity, the HML group explains how to understand the perspectives of themselves and group members, explain the interactions used during problem solving. The HML group can also explain the reasons for the division of roles and each task, explain the meeting point and the extent of the results of the discussion, understand the progress of the task being done, realize the role of other members and how cooperation occurs. During the problem-solving process, the HML group understood how their involvement, the monitoring process, the evaluation process and explained it in an interview with the researcher.

In the evaluating activity, the HML group assesses the truth of the perspective regarding the abilities of themselves and group members, assesses the interactions used in solving problems, assesses the effectiveness of the division of roles, the truth of the meeting point that has been discussed, the results of the tasks done by themselves, assesses the tasks done by other group members, assesses the results of communication in the group regarding the actions that will be carried out, assesses the plans that have been set, assesses the results of their involvement, assesses the results of joint monitoring and evaluation. In collaborative problem-solving, high- and medium-skilled students can act as conceptualizers. The initiator will be a student who has mastered the material for the given problem. Low-skilled students can also act as conceptualizers if the problem relates to material they understand.

REFERENCES

Abubakar, R. (2021). Pengantar Metodologi Penelitian. In *Antasari Press*. Suka-Press.

Çini, A., Järvelä, S., Dindar, M., & Malmberg, J. (2023). How Multiple Levels Of Metacognitive Awareness Operate In Collaborative Problem Solving. In *Metacognition And Learning* (Vol. 18, Issue 3). Springer Us. Https://Doi.Org/10.1007/S11409-023-09358-7

Dindar, M., Järvelä, S., & Järvenoja, H. (2020). Interplay Of Metacognitive Experiences And Performance In Collaborative Problem Solving. *Computers And Education*, *154*. Https://Doi.Org/10.1016/J.Compedu.2020.103922

Ciptaan disebarluaskan di bawah Lisensi Creative Commons Atribusi 4.0 Internasional

Firmansyah, F. F., Yudianto, E., Febriyanto, E. Y., & Sulihah, N. T. (2025). *Proses Metakognisi Dalam Interaksi Siswa Pada Diskusi Kelompok*. *09*(37), 553–563.

Flavell, J. H. (1979). Metacognition And Cognitive Monitoring A New Area Of Cognitive — Developmental Inquiry. In *American Psychologist* (Vol. 34, Issue 10, Pp. 906–911).

Goos, M., & Galbraith, P. (1996). Do It This Way! Metacognitive Strategies In Collaborative Mathematical Problem Solving. *Educational Studies In Mathematics*, *30*(3), 229–260. Https://Doi.Org/10.1007/Bf00304567

Graesser, A., Kuo, B. C., & Liao, C. H. (2017). Complex Problem Solving In Assessments Of Collaborative Problem Solving. *Journal Of Intelligence*, *5*(2), 1–14. Https://Doi.Org/10.3390/Jintelligence5020010

Güner, P., & Erbay, H. N. (2021). Metacognitive Skills And Problem-Solving. International *Journal Of Research In Education And Science*, *7*(3), 715–734. Https://Doi.Org/10.46328/Ijres.1594

Indah, F., Permata, S., & Nugraha, J. (2020). Analisis Model Pembelajaran Kooperatif Tipe Make A Match Sebagai Upaya Meningkatkan Pemahaman Konsep Surat Niaga Analisis Model Pembelajaran Kooperatif Tipe Make A Match …. *Jurnal Pendidikan Administrasi Perkantoran*, *8*(3), 393–410.

Jones, M. H., Audley-Piotrowski, S. R., & Kiefer, S. M. (2012). Relationships Among Adolescents' Perceptions Of Friends' Behaviors, Academic Self-Concept, And Math Performance. *Journal Of Educational Psychology*, *104*(1), 19–31. Https://Doi.Org/10.1037/A0025596

Kemendikbudristek. (2024). *Kajian Akademik Kurikulum Merdeka*. Pusat Kurikulum Dan Pembelajaran Badan Standar, Kurikulum, Dan Asesmen Pendidikan Kementerian Pendidikan, Kebudayaan, Riset, Dan Teknologi.

Leikin, R., & Zaslavsky, O. (1997). Facilitating Student Interactions In Mathematics In A Cooperative Learning Setting. *Journal For Research In Mathematics Education*, *28*(3), 331–354. Https://Doi.Org/10.2307/749784

Murtadho, F. (2020). Budaya Literasi Terbangkitkan Dengan Strategi Metakognisi. *Seminar Nasional Literasi Prodi Pbsi Fpbs Upgris*, 1–17. Https://Jurnal.Untan.Ac.Id/Index.Php/Jpdpb/Article/View/33044/75676581283

Nctm. (2010). *Why Is Teaching With Problem Solving Important To Student Learning? 703*.

Oecd. (2013). *Draft Pisa 2015 Collaborative Problem Solving Framework*.

Oecd. (2019). *Pisa 2018 Results (Volume I): Vol. I*. Https://Doi.Org/10.1787/5f07c754-En

Ridlo, U. (2023). Metode Penelitian Studi Kasus: Teori Dan Praktik. In *Publica Indonesia Utama*. Https://Notes.Its.Ac.Id/Tonydwisusanto/2020/08/30/Metode-Penelitian-Studi-Kasus-Case-Study/

Rizqiani, S. A., & Hayuhantika, D. (2019). Analisis Metakognisi Dalam Penyelesaian Masalah Matematika Ditinjau Dari Tingkat Kemampuan

Ciptaan disebarluaskan di bawah Lisensi Creative Commons Atribusi 4.0 Internasional

Matematika. *Jp2m (Jurnal Pendidikan Dan Pembelajaran Matematika)*, *5*(1), 26–32. Https://Doi.Org/10.29100/Jp2m.V5i1.1734

Safitri, P. T., Yasintasari, E., Putri, S. A., & Hasanah, U. (2020). Analisis Kemampuan Metakognisi Siswa Dalam Memecahkan Masalah Matematika Model Pisa. *Journal Of Medives : Journal Of Mathematics Education Ikip Veteran Semarang*, *4*(1), 11. Https://Doi.Org/10.31331/Medivesveteran.V4i1.941

Siagian, M. V, Saragih, S., & Sinaga, B. (2019). Development Of Learning Materials Oriented On Problem-Based Learning Model To Improve Students' Mathematical Problem Solving Ability And Metacognition Ability. *International Electronic Journal Of Mathematics Education*, *14*(2), 331–340. Https://Doi.Org/Https://Doi.Org/10.29333/Iejme/5717

Siswono, T. Y. E. (2019). *Paradigma Penelitian Pendidikan* (1st Ed.). Pt Remaja Rosdakarya.

Suryaningtyas, S., & Setyaningrum, W. (2020). Analisis Kemampuan Metakognitif Siswa Sma Kelas Xi Program Ipa Dalam Pemecahan Masalah Matematika. *Jurnal Riset Pendidikan Matematika*, *7*(1), 74–87. Https://Doi.Org/10.21831/Jrpm.V7i1.16049

Sutama, S., Anif, S., Prayitno, H. J., Narimo, S., Fuadi, D., Sari, D. P., & Adnan, M. (2021). Metacognition Of Junior High School Students In Mathematics Problem Solving Based On Cognitive Style. *Asian Journal Of University Education*, *17*(1), 134–144. Https://Doi.Org/10.24191/Ajue.V17i1.12604

Wulandari, S., Hartoyo, A., & Suratman, D. (2019). Keterampilan Metakognisi Siswa Dalam Pemecahan Masalah Perbandingan. *Jurnal Pendidikan Dan Pembelajaran*, *8*(5), 1–8. Https://Jurnal.Untan.Ac.Id/Index.Php/Jpdpb/Article/View/33044/75676581283

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