Journal of Mathematics Education
Website: http://usnsj.id/index.php/JME
Email: pengelolajme@gmail.com
p-ISSN 2528-2468; e–ISSN 2528-2026

DOI: https://doi.org/10.31327/jme.v10i1.641

EXPLORATION OF STUDENT'S MATHEMATICAL CONNECTION ABILITY BASED ON LEARNING MOTIVATION

Rafika Meiliati[1], Achmad Salido[2], Aswin[3], Dayana Sabila Husain[4]
[1,2,3,4] Universitas Sembilanbelas November Kolaka

Article Info

Article history:

Received Apr 12, 2025
Revised Mei 20, 2025
Accepted Jun 03, 2025

Keywords:

Mathematical connections
learning motivation
Instructional strategies
Contextual learning
Mathematics

ABSTRACT

This study aimed to explore and explain students' mathematical connection abilities based on their levels of learning motivation. A qualitative investigative approach involved junior high school students categorized into three motivation levels: high, moderate, and low. Data were collected through a learning motivation questionnaire and problem-solving tasks to assess students' mathematical connection skills. The results revealed that highly motivated students demonstrated the strongest abilities, characterized by their capacity to connect various mathematical concepts, effectively use visual representations, and apply concepts in real-life and interdisciplinary contexts. In contrast, moderately motivated students tended to rely on basic procedures without developing a comprehensive conceptual understanding, while students with low motivation struggled to comprehend and relate concepts, often copying information without formulating appropriate solution strategies. These findings highlight the critical role of learning motivation in fostering mathematical connection skills. Therefore, implementing instructional strategies that enhance student motivation—such as problem-based and contextual learning approaches—is essential for promoting more profound understanding and stronger mathematical connections.

Corresponding Author:

Rafika Meiliati,
Pendidikan Matematika,
Universitas Sembilanbelas November Kolaka, Indonesia
Email: rafikameiliati@gmail.com
Phone Number : 085342824433

How to Cite:

Meiliati, R., Salido, A., Aswin, Husain, D.S.. (2023). Exploration Of Student's Mathematical Connection Ability Based On Learning Motivation. *JME:Journal of Mathematics Education*, 10(1), 72-85.

1. INTRODUCTION

Mathematics requires students to possess advanced cognitive abilities, including the capacity to establish mathematical connections. Mathematical connection skills enable students to relate mathematical concepts to various contexts, including real-world situations, interdisciplinary applications, and different areas within mathematics (Bannor et al., 2024; Jahring, 2020). Cultivating this ability deepens conceptual understanding, enhances problem-solving capabilities, and strengthens mathematical reasoning (Bahar et al., 2023). The National Council of Teachers of Mathematics underscores the significance of mathematical connections, asserting that recognizing interrelationships among concepts leads to more meaningful learning experiences (Arifin et al., 2024; Hasbi et al., 2019). Students with strong mathematical connection skills transfer their knowledge more effectively and demonstrate productive and flexible thinking when solving problems (Jawad, 2022; Sulistiyowati & Wahyuni, 2024). In addition, these skills contribute to improving critical thinking and logical reasoning (Sari et al., 2023).

Research has categorized mathematical connections into several classifications, such as patterns, variables, and arguments (Kholid & Dewi, 2024). In addition, the development of mathematical connection skills is influenced by various factors, including teaching strategies, mathematics anxiety, student self-confidence, and learning motivation (Haerudin et al., 2021; Suparti & Netriwati, 2021). In particular, contextual teaching approaches and non-routine problems have improved the ability to form meaningful mathematical connections (Khairunnisak et al., 2020; Rodríguez-Nieto et al., 2023). Among these factors, learning motivation plays an important role because motivation drives students' engagement and persistence in learning mathematics (Dai et al., 2023; Siagian et al., 2022). Motivated students tend to explore relationships between concepts more and develop a deeper understanding of mathematical content. Therefore, educators are encouraged to design teaching strategies that foster motivation while emphasizing the interconnected nature of mathematical ideas (Khairunnisak et al., 2020; Purnama & Rahayu, 2023).

Learning motivation plays a crucial role in shaping students' academic achievement, particularly in mathematics education. Motivation drives students to engage with learning materials, persist through challenges, and develop a positive attitude toward mathematics (Lazareva & Ustinova, 2020). It is generally classified into two categories: intrinsic and extrinsic. Intrinsic motivation refers to an internal drive to learn for personal satisfaction, whereas extrinsic motivation involves external rewards or pressures (Serin, 2018). Students with high motivation tend to exhibit stronger cognitive engagement, mathematical connection skills, and problem-solving abilities compared to those with low motivation (Siagian et al., 2022; Zhang et al., 2023). Conversely, a lack of motivation can hinder students' cognitive engagement, limiting their ability to establish meaningful relationships between mathematical concepts (Sholeha et al., 2022; Xia et al., 2022). Understanding the relationship between students' motivation and their mathematical connection abilities can help educators design teaching strategies that foster both cognitive and affective aspects of learning.

Several studies have explored mathematical connection abilities in different contexts. Raniri et al. (2025) investigated the relationship between students' mathematical connections and resilience, finding that students with high resilience demonstrated stronger conceptual integration in mathematics learning. Kemhay et al. (2025) examined the influence of gender on mathematical connections, identifying performance variations between male and female students. Lumbanraja et al. (2025) highlighted the effectiveness of problem-based learning in enhancing mathematical connection skills. However, research directly linking students' learning motivation to their mathematical connection abilities remains limited. Most existing studies focus on cognitive strategies or demographic factors, leaving a gap in understanding how motivation influences students' ability to form mathematical connections.

Unlike previous research that has primarily relied on quantitative methodologies, this study provides a deeper understanding of students' perspectives, challenges, and cognitive processes through qualitative analysis. By adopting a case study approach, it seeks to capture the nuances of students' motivation levels and their impact on mathematical connection skills in a real-world classroom setting. The findings offer valuable insights for educators in developing more effective pedagogical strategies to enhance students' learning experiences. This study aims to describe and explain students' mathematical connection abilities based on students' learning motivation in junior high school students. By identifying patterns and correlations between these variables, this study aims to provide insight into how motivation influences students' ability to establish mathematical relationships. The findings will contribute to the development of effective pedagogical strategies that enhance student engagement and understanding in mathematics learning. Furthermore, understanding these relationships can help educators create learning environments that support both cognitive and affective development, ultimately improving students' overall mathematical proficiency.

2. METHOD

This study employed a qualitative investigative approach to examine students' mathematical connection abilities based on their levels of learning motivation. The research was conducted at a junior high school in Kolaka Regency, Southeast Sulawesi Province. The participants consisted of 30 seventh-grade students selected through purposive sampling based on the criteria that they actively participated in classroom learning and voluntarily agreed to be part of the study.

The study followed a systematic process in its data collection procedures. First, three experts developed and validated a learning motivation questionnaire and a set of problem-solving tasks to ensure their validity and reliability. The motivation questionnaire comprised 36 statement items, while the problem-solving task comprised three questions about plane figures. These tasks were constructed based on mathematical connection indicators, including (1) connections between mathematical topics, (2) connections between mathematics and other disciplines, and (3) connections between mathematics and everyday life (Hidayati & Jahring, 2021).

Second, the validated motivation questionnaire was administered to all participants to categorize them into high, moderate, and low-motivation groups. This categorization was based on the range method or frequency distribution (Sugiyono, 2015). Finally, participants were given problem-solving tasks to complete. Their responses were then analyzed in depth and classified according to their level of motivation.

Data analysis in this study followed four stages: data presentation, reduction, interpretation, and conclusion drawing (Miles et al., 2014; Sanjani et al., 2024). In the data presentation stage, students' problem-solving results were categorized based on indicators of mathematical connection ability. During data reduction, relevant information was selected and simplified to align with the research objectives. The interpretation stage involved synthesizing the findings into a coherent narrative, emphasizing students' mathematical connection skills about their motivation levels. Finally, in the conclusion-drawing stage, the relationships between categories were analyzed, and strategies were proposed to improve students' mathematical connection abilities. Data triangulation was employed by cross-verifying information from multiple data sources to ensure the validity of the findings.

3. RESULTS AND DISCUSSION

3.1. Results

The measurement results of students' learning motivation in this study, which followed the range method, are presented in Table 1.

Table 1. Results of grouping students based on their motivation level

Score interval	Category	Frequency	Percentage (%)
108 - 144	High	10	33.33
72 - 107	Moderate	12	40
36 - 71	Low	8	26.67
Total		30	100

Table 1 presents the distribution of students' learning motivation categorized into three levels: high, moderate, and low. The majority of students (40%) fall into the moderate motivation category, followed by 33.33% in the high motivation category, and 26.67% in the low motivation category. This variation in motivation serves as a basis for investigating students' mathematical connection abilities in problem-solving.

1. Mathematical Connection Ability in a highly motivated group

   The presentation of the results of solving the problem of the representative of the high group subject in the first problem is presented in Figure 1. This task involved calculating the perimeter and area of a trapezoid.

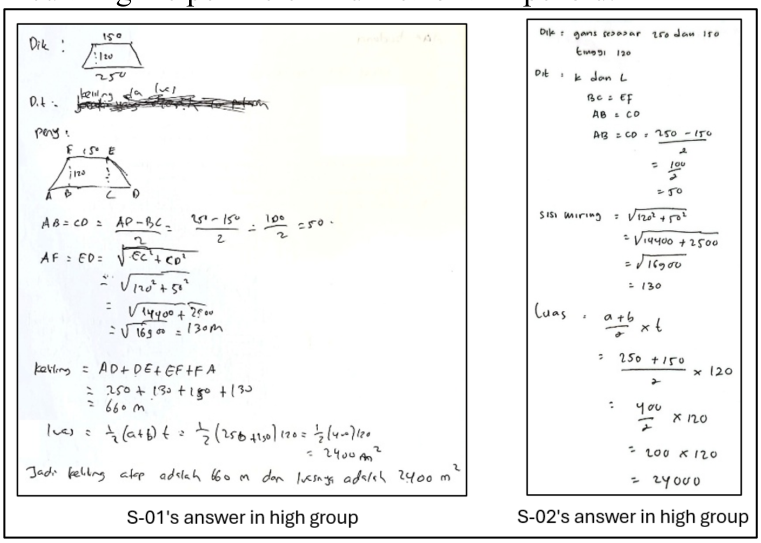

Figure 1. High group studens' answers to the first problem

Figure 1 illustrates that students in the high-motivation group successfully solved the first problem by applying a systematic procedure. They utilized the Pythagorean Theorem to calculate the perimeter and area of the trapezoid. In their problem-solving process, these students demonstrated a clear understanding of the given information, formulated appropriate strategies, and applied them sequentially to arrive at a solution. However, variation in solution quality was observed. For example, while S-01 provided a correct and complete response, S-02's answer lacked completeness; S-02 failed to determine the perimeter and only calculated the area. Additionally, S-02 did not include proper units in the answer. Another notable finding is that S-01 employed visual representations to clarify the relationships among involved mathematical concepts. Figure 2 presents the response of a high-motivation student to the second problem, which required connecting geometric concepts with knowledge of bacterial growth.

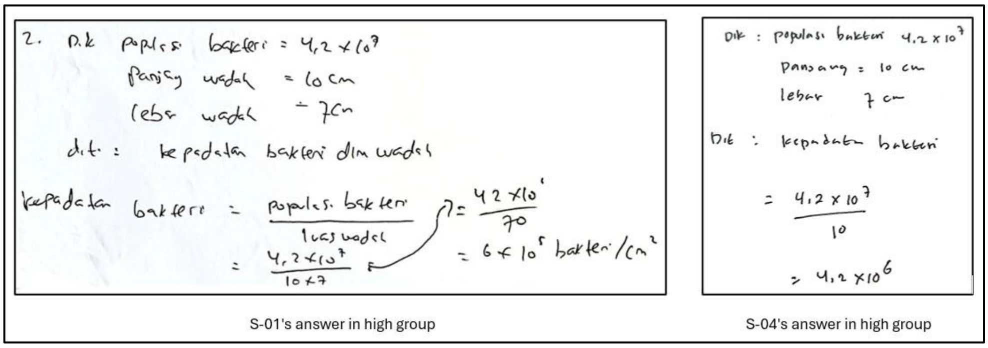

Figure 2. High group students' answers to the second problem

Figure 2 shows that students in the high-motivation group were able to solve the second problem, which required linking mathematical concepts with other fields. The task involved applying the concept of rectangular area within the context of bacterial growth. These students demonstrated the ability to connect mathematical concepts to scientific contexts, reflecting an understanding of the broader applicability of mathematics. Nevertheless, variations in the quality of responses were noted. For instance, S-01 provided a correct solution, while S-03 made an error in the use of the formula. The correct calculation step should have been " $\frac{4,2\times10^7}{10}$ ", but S-03 wrote " $\frac{4,2\times10^7}{10\times7}$ " resulting in an incorrect final answer. Figure 3 shows the high-motivation students' responses to the third problem, which involved associating mathematical concepts from plane geometry, particularly the square and kite.

Figure 3 illustrates that students in this group successfully solved the third problem using a systematic approach. They demonstrated their ability to connect mathematical concepts related to squares and kites, with their solutions reflecting a solid understanding of the relationships among various geometric figures. However, S-02 exhibited a similar pattern to the first problem by again omitting the appropriate units in the final answer.

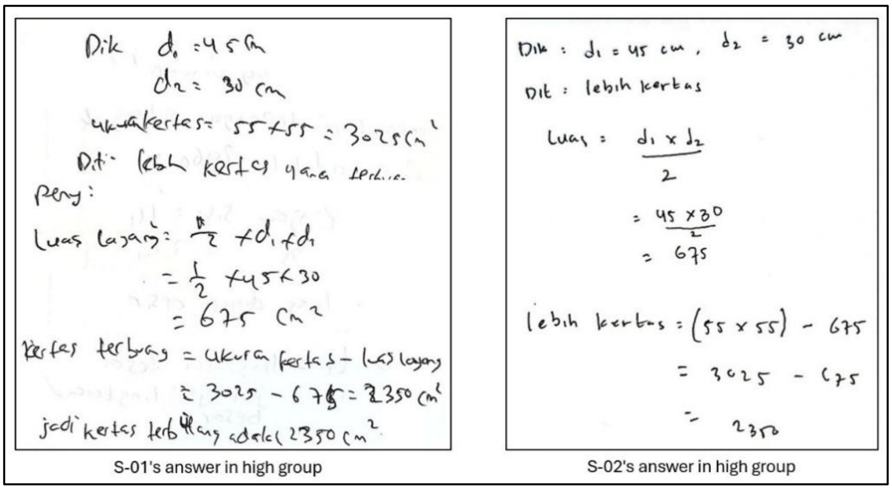

Figure 3. High group students' answers to the third problem

2. Mathematical Connection Ability in the moderate motivation group

A representative of the sample answers of moderate group subjects in the first problem is presen ted by Figure 4.

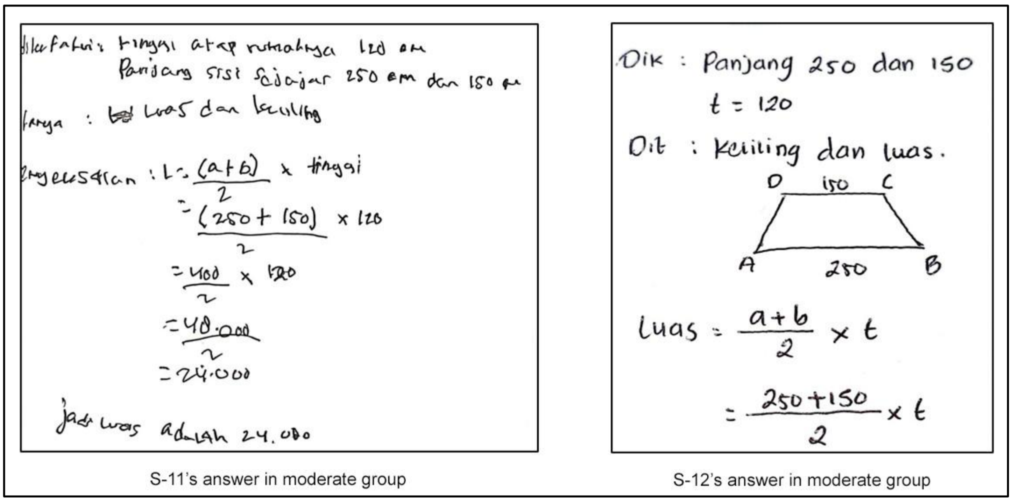

Figure 4. Moderate group students' answers to the first problem

Figure 4 indicates that students in the moderate-motivation group made a commendable effort to solve the first problem by following basic problem-solving steps. They were able to identify key information and understand the problem's objective. However, their work focused solely on calculating the area, without proceeding to determine the perimeter. Moreover, it can be seen that student S-12 employed visual representations to support the problem-solving process. Figure 5 presents this group's responses to the second problem.

Figure 5 shows that students in the moderate-motivation group encountered difficulties in solving the second problem. They managed to identify basic information and understand the objective of the task but were unable to proceed to the solution stage. One student (S-15) attempted a solution, but the approach taken was incorrect. These findings indicate that although students made efforts to solve the problem, they were not successful. Figure 6 presents their responses to the third problem.

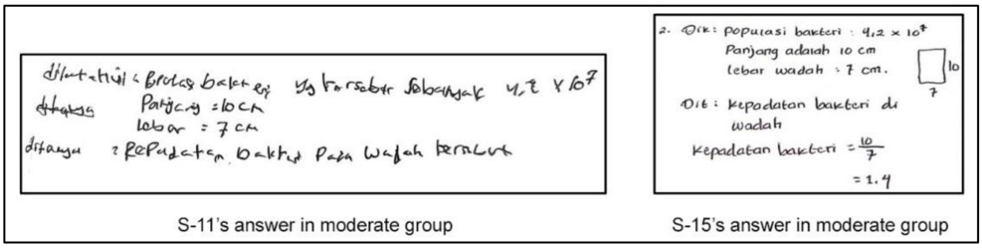

Figure 5. Moderate group students' answers to the second problem

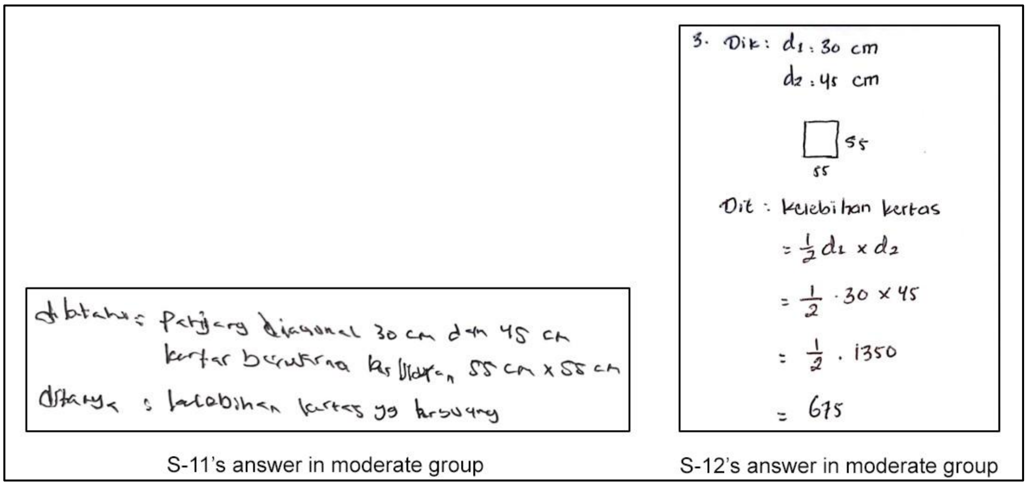

Figure 6. Moderate group students' answers to the third problem

Figure 6 illustrates that students in the moderate-motivation group attempted to solve the third problem, although they faced limitations in reaching a final solution. Variation in responses was observed in this group: some students only reached the stage of identifying information and understanding the problem's goal, while others attempted a solution but failed to complete it. Some responses also showed the use of visual representations.

3. Mathematical Connection Ability in low-motivation group

The representative of the sample answers of the low group subjects in the first problem is presented by Figure 7.

Figure 7 shows that students in the low-motivation group were unable to correctly solve the first problem. However, there was evidence of effort to engage with the task. For example, student S-24 not only noted the problem information but also attempted several solution steps, though the steps taken were incorrect. Figure 8 presents the response of low-motivation students to the second problem.

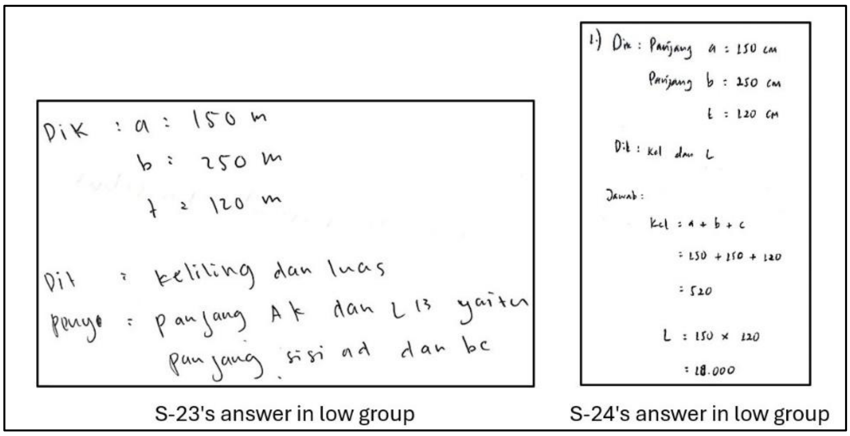

Figure 7. Low group students' answers to the first problem

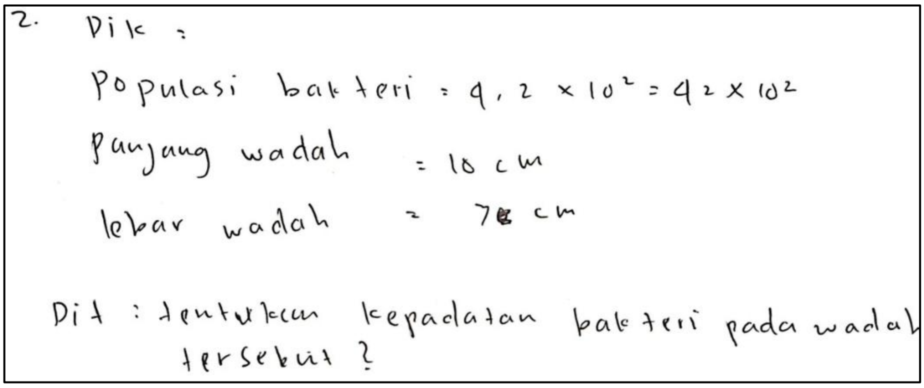

Figure 8. Low group students' answers to the second problem

Figure 8 demonstrates that students in the low-motivation group showed limited ability to solve the second problem. They were able to restate the given information but could not proceed to the solution stage. This pattern was consistent across other students in the same group. Similar characteristics were also observed in their responses to the third problem.

3.2. **Discussion**

The findings of this study reveal a significant relationship between students' levels of learning motivation and their mathematical connection abilities in problem-solving, particularly in the context of geometry. Students in the high-motivation group demonstrated the most advanced characteristics of mathematical connection ability. In the first problem, they successfully solved tasks related to the perimeter and area of a trapezoid using a systematic approach. Their steps—including understanding the problem context, selecting appropriate strategies (such as applying the Pythagorean Theorem), and performing accurate calculations—reflect strong procedural mastery supported by conceptual understanding. This finding aligns with Ulya et al. (2016), who stated that highly motivated students tend to develop structured and goal-oriented solutions. Moreover, visual representations, such as diagrams to clarify the relationships between geometric elements (as seen in the response of subject S-01), serve as an important indicator of conceptual mastery in mathematical connections. This supports Romli (2017) argument that highly motivated students are likelier to utilize visual representations to strengthen their understanding and inter-conceptual links. Despite some technical shortcomings, such as S-02's omission of units in the answer, this group still demonstrated the ability to integrate mathematical information holistically.

In the second problem, which assessed cross-disciplinary connections between mathematics and science within bacterial growth, the high-motivation group could relate area concepts to real-world phenomena. Subject S-01 successfully solved the problem, while S-03 made a calculation error. This supports Finn's (2020) assertion that although high motivation increases the likelihood of success, misconceptions may arise if instruction does not emphasize conceptual understanding. Nevertheless, the ability of highly motivated students to engage in cross-disciplinary contexts reflects a high degree of cognitive flexibility (Siagian et al., 2022; Tririnika et al., 2024).

In the third problem, which required connecting concepts of plane figures such as squares and kites, students in the high-motivation group again demonstrated their ability to integrate symbolic and visual representations. This indicates procedural competence and a conceptual ability to relate and apply mathematical ideas. These findings are consistent with Yanto et al. (2022) and 'Azizah et al. (2021), who found that highly motivated students connect mathematical topics, integrate knowledge across disciplines and relate mathematical learning to everyday life. In addition, their ability to select appropriate strategies and evaluate their thought processes indicates a strong metacognitive awareness (Mulbar et al., 2021).

In contrast, students in the moderate-motivation group exhibited partial and still limited mathematical connection abilities. In the first problem, they were able to identify basic information and calculate the area but often did not proceed to determine the perimeter. This finding suggests a tendency to rely on memorized procedures without a deep conceptual understanding. Some students, such as S-12, began using diagrams as visual aids, indicating emerging conceptual potential, though it was not yet fully developed.

In the second problem, the limitations in bridging mathematics with scientific contexts became more apparent. Most students in the moderate group could only mention the basic information provided in the problem without successfully developing a solution strategy. For example, S-15 attempted to solve the problem but demonstrated a misconception using the formula. This shows that students in this group lacked cognitive flexibility and struggled to make cross-contextual connections. These findings are in line with reports from Mirna et al. (2023), Utami (2022), and Agsya et al. (2019), who noted that moderately motivated students often face challenges in applying knowledge comprehensively and conceptually. Mutialawati et al. (2024) also emphasized that insufficient conceptual exploration results in a fragmented understanding of mathematics learning.

When solving the third problem, some students in the moderate-motivation group managed to identify key elements of the task but could not complete the solution. Their efforts were mostly limited to initial steps, such as reading and understanding the problem, without proceeding to in-depth analysis or using effective strategies. Some students used diagrams, indicating potential, though not yet supported by comprehensive connection skills. Therefore, instructional strategies that promote connection skills through exploration, reflection, and real-world application are needed. This finding is supported by Kurnia et al. 92019), who suggested contextual learning as a practical approach for developing the conceptual skills of moderately motivated students.

Meanwhile, students in the low-motivation group demonstrated the weakest characteristics in mathematical connection ability. In the first problem, they generally only copied information from the problem without formulating a strategy or progressing to solution steps. Subject S-24, for instance, attempted a solution, but the approach taken was incorrect, reflecting limited conceptual and procedural understanding. Similar issues were observed in the second and third problems. Most students in the low group merely restated the problem's information without processing it or making meaningful attempts to solve it. There was no evidence of effort to connect mathematical concepts to other disciplines or everyday life. These findings are consistent with research by Pujakusuma (2019) and Rismawati and Khairiati (2020), who stated that low-motivation students tend to lack persistence and self-confidence, making it difficult to solve problems requiring conceptual understanding.

Moreover, negative attitudes toward mathematics—such as perceiving it as irrelevant to their lives—contributed to their reluctance to explore and build inter-conceptual connections. Nevertheless, Millaty (2021) emphasized that students in this group still have growth potential when supported in an engaging and supportive learning environment. Interactive and contextual instruction that emphasizes real-life applications has been effective in helping them develop a more profound understanding.

These findings underscore the crucial role of learning motivation in shaping students' mathematical connection abilities. Highly motivated students demonstrated flexible thinking, deep conceptual understanding, and the ability to integrate knowledge across contexts. Conversely, students with moderate and low motivation exhibited more procedural, fragmented understanding and struggled to establish cross-concept or interdisciplinary links. Therefore, increasing students' learning motivation should be accompanied by implementing instructional strategies that foster meaningful cognitive engagement. Teachers and educators must integrate both motivational and cognitive dimensions in mathematics instruction. Approaches that utilize real-world contexts and diverse representations and encourage metacognitive reflection are key to strengthening conceptual connections (Asmawati et al., 2019; Ulya et al., 2016). Through this comprehensive approach, students across all motivation levels will have greater opportunities to develop robust mathematical connection abilities, which are fundamental to long-term mathematical literacy and lifelong learning (Mone et al., 2022).

4. CONCLUSION

This study aimed to explore and explain students' mathematical connection abilities based on their levels of learning motivation. The findings indicate that students' motivation levels significantly influence their mathematical connection abilities. Highly motivated students demonstrated the strongest abilities, characterized by their capacity to connect various mathematical concepts, effectively utilize visual representations, and apply concepts in real-life and interdisciplinary contexts. In contrast, moderately motivated students tended to rely only on basic procedures without developing a comprehensive conceptual understanding, while low-motivation students struggled to comprehend and relate concepts, often merely copying information without formulating appropriate problem-solving strategies.

These findings underscore that the development of mathematical connection abilities cannot be separated from efforts to enhance students' learning motivation. Therefore, educators must design instructional approaches beyond content mastery and foster cognitive engagement through contextual learning, using multiple forms of representation, and strengthening metacognitive awareness. Such approaches can support students across different motivation levels in developing more meaningful and robust mathematical connections.

While this study offers important insights, several limitations must be acknowledged. The research was conducted using a qualitative approach with a limited number of participants, restricting the generalizability of the findings to a broader population. Moreover, the study focused solely on the relationship between learning motivation and mathematical connections without considering other potential influencing factors, such as individual learning strategies or social-environmental influences. Future research is encouraged to adopt broader methodological approaches, such as mixed-methods or quantitative studies, to validate these findings on larger samples. Furthermore, in-depth investigations into learning interventions that enhance both student motivation and mathematical connections are necessary to provide concrete recommendations for effective teaching practices in schools.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to the junior high schools in Kolaka Regency, Southeast Sulawesi Province, for their valuable support and cooperation throughout the course of this research.

REFERENCES

'Azizah, D. N., Hidayanto, E., & Sisworo, S. (2022). Kemampuan koneksi matematis siswa dalam pemecahan masalah bangun ruang sisi datar berbasis Polya. *JIPM (Jurnal Ilmiah Pendidikan Matematika)*, *10*(2), 256–267. https://doi.org/10.25273/jipm.v10i2.8818

Agsya, F. M., Maimunah, M., & Roza, Y. (2019). Analisis kemampuan pemecahan masalah ditinjau dari motivasi belajar siswa MTs. *Symmetry: Pasundan Journal of Research in Mathematics Learning and Education*, *4*(volume 4), 31–44. https://doi.org/10.23969/symmetry.v4i2.2003

Arifin, N., Nurjanah, N., & Muzammil, M. (2024). Analysis of students' mathematical connection ability in solving task of function. *KnE Social Sciences*, 490–499. https://doi.org/10.18502/kss.v9i13.15951

Asmawati, A., Risnawati, R., & Muhandaz, R. (2019). Pengaruh penerapan strategi pembelajaran metakognitif terhadap kemampuan koneksi matematis berdasarkan kemandirian belajar siswa SMP/MTs. *JURING (Journal for Research in Mathematics Learning)*, *2*(3), 273. https://doi.org/10.24014/juring.v2i3.7813

Bahar, R., Munadi, S., & Rosnawati, R. (2023). The brainstorming method on Pesantren students' mathematical connection and metacognition skills. *Pegem Journal of Education and Instruction*, *13*(3), 228–238. https://doi.org/10.47750/pegegog.13.03.24

Bannor, G. A., Arthur, Y. D., & Obeng, B. A. (2024). Effects of perceived mathematics connection on mathematics motivation: mediating role of history of mathematics concepts. *IJMME International Journal of Mathematics and Mathematics Education*, *2*(1), 1–14. https://doi.org/10.56855/ijmme.v2i1.898

Dai, C.-P., Ke, F., Pan, Y., & Liu, Y. (2023). Exploring students' learning support use in digital game-based math learning: A mixed-methods approach using machine learning and multi-cases study. *Computers & Education*, *194*. https://doi.org/https://doi.org/10.1016/j.compedu.2022.104698

Finn, B. (2020). Exploring interactions between motivation and cognition to better shape Self-regulated learning. *Journal of Applied Research in Memory and Cognition*, *9*(4), 461–467. https://doi.org/10.1016/j.jarmac.2020.08.008

Haerudin, H., Anjani, D., & Ibrahi, D. (2021). Effect of math anxiety and motivation against student mathematical connections capabilities. *Hipotenusa : Journal of Mathematical Society*, *3*(1), 52–79. https://doi.org/10.18326/hipotenusa.v3i1.52-79

Hasbi, M., Lukito, A., & Sulaiman, R. (2019). The realistic of mathematic educational approach to enhancing ability mathematical connections. *International Journal of Trends in Mathematics Education Research*, *2*(4), 179–183. https://doi.org/10.33122/ijtmer.v2i4.82

Hidayati, U., & Jahring, J. (2021). Analisis kemampuan koneksi matematis siswa ditinjau dari gaya belajar. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *10*(4), 2890. https://doi.org/10.24127/ajpm.v10i4.4417

Jahring, J. (2020). Kemampuan koneksi matematis pada model pembelajaran connecting, organizing, reflecting, extending dan numbered head together. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *9*(1), 182–189. https://doi.org/10.24127/ajpm.v9i1.2667

Jawad, L. F. (2022). Mathematical connection skills and their relationship with productive thinking among secondary school students. *Periodicals of Engineering and Natural Sciences*, *10*(1), 421–430. https://doi.org/10.21533/pen.v10i1.2667

Kemhay, S., Abdullah, I. H., & Sari, D. P. (2025). Analisis kemampuan koneksi matematis siswa SMP pada materi lingkaran ditinjau dari gender. *Jurnal Pendidikan Guru Matematika*, *5*(1), 84–96.

Khairunnisak, C., Hasbi, M., Mustika, A., & Elizar, E. (2020). Students' mathematical connection ability in the learning employing contextual teaching and learning. *Journal of Physics: Conference Series*, *1460*(1). https://doi.org/10.1088/1742-6596/1460/1/012028

Kholid, M. N., & Dewi, R. (2024). How are the classification of students' mathematical connections in solving non-routine problems? *Al-Jabar : Jurnal Pendidikan Matematika*, *15*(1), 99. https://doi.org/10.24042/ajpm.v15i1.19633

Kurnia, I. R., Ariyanto, L., & Sutrisno, S. (2019). Pengaruh model pembelajaran CTL ditinjau dari motivasi siswa terhadap kemampuan pemahaman konsep matematis kelas VII. *Media Penelitian Pendidikan : Jurnal Penelitian Dalam Bidang Pendidikan Dan Pengajaran*, *13*(1), 29. https://doi.org/10.26877/mpp.v13i1.5086

Lazareva, E. G., & Ustinova, I. G. (2020). Motivation and It's Connection with the Achievements in Math of University Students. *The Impact of the 4th Industrial Revolution on Engineering Education: Proceedings of the 22nd International Conference on Interactive Collaborative Learning (ICL2019)*, 704–712. https://doi.org/10.1007/978-3-030-40271-6_69

Lumbanraja, A. H., Ammy, P. M., & Nasution, S. (2025). Peningkatan koneksi matematika melalui model problem-based learning dengan pendekatan culturally responsive teaching. *JMES (Journal Mathematics Education Sigma)*, *6*(1), 32–40.

Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative Data Analysis A Methods Sourcebook Edition 3*. SAGE Publications, Inc.

Millaty, V. N. (2021). Pengaruh kemandirian belajar terhadap kemampuan koneksi matematis siswa pada materi segiempat. *Jurnal Didactical Mathematics*, *3*(1), 33–40. https://doi.org/10.31949/dmj.v2i2.2074

Mirna, M., Mudjiran, M., Aysi, R., & Murni, D. (2023). Analisis pengaruh motivasi belajar terhadap pemahaman konsep matematis peserta didik. *Jurnal Muara Pendidikan*, *8*(1), 96–107. https://doi.org/10.52060/mp.v8i1.1054

Mone, P. S., Nenohai, J. M. H., & Samo, D. D. (2022). Kemampuan koneksi matematis siswa dalam pembelajaran matematika di tingkat SMP. *Fraktal: Jurnal Matematika Dan Pendidikan Matematika*, *3*(1), 12–24. https://doi.org/10.35508/fractal.v3i1.5602

Mulbar, U., Alimuddin, A., & Mukarramah, S. (2021). Metakognisi siswa SMA dalam menyelesaikan masalah matematika. *Issues in Mathematics Education (IMED)*, *5*(2), 91. https://doi.org/10.35580/imed23840

Mutialawati, E., Nurcahyono, N. A., & Balkist, P. S. (2024). Analisis kemampuan pemecahan masalah matematis menggunakan soal PISA ditinjai dari motivasi belajar siswa. *Jurnal Educatio*, *10*(4), 1071–1083. https://doi.org/10.31949/educatio.v10i4.8662

Pujakusuma, G. K. (2019). Analisis kesalahan pemecahan masalah matematika dan motivasi belajar siswa pada materi dimensi tiga. *AKSIOMA : Jurnal Matematika Dan Pendidikan Matematika*, *10*(2), 172–179. https://doi.org/10.26877/aks.v10i2.4711

Purnama, R. G., & Rahayu, S. (2023). The role of process oriented guided inquiry learning (POGIL) and its potential to improve students' metacognitive ability: A systematic review. *AIP Conference Proceedings*, *2569*(1), 30009. https://doi.org/10.1063/5.0113476

Raniri, S. N. Al, Jaenudin, A., & Yusuf, Y. (2025). Kemampuan koneksi matematis siswa SMP pada materi perbandingan ditinjau dari resiliensi matematis. *Proximal: Jurnal Penelitian Matematika Dan Pendidikan Matematika*, *8*(1), 169–178. https://doi.org/10.30605/proximal.v8i1.5001 Halaman

Rismawati, M., & Khairiati, E. (2020). Analisis faktor yang mempengaruhi rendahnya motivasi belajar siswa pada mata pelajaran matematika. *J-PiMat : Jurnal Pendidikan Matematika*, *2*, 203–212. https://doi.org/10.31932/j-pimat.v2i2.860

Rodríguez-Nieto, C. A., Cervantes-Barraza, J. A., & Moll, V. F. (2023). Exploring mathematical connections in the context of proof and mathematical argumentation: A new proposal of networking of theories. *Eurasia Journal of Mathematics, Science and Technology Education*, *19*(5). https://doi.org/10.29333/ejmste/13157

Romli, M. (2017). Profil koneksi matematis siswa perempuan SMA dengan kemampuan matematika tinggi dalam menyelesaikan masalah matematika. *JIPMat*, *1*(2), 145–157. https://doi.org/10.26877/jipmat.v1i2.1241

Sanjani, A. R., Salido, A., Nasrum, A., Chairuddin, C., Jahring, J., & Sari, D. U. (2024). Exploring grade 8 students' procedural skills in solving pythagorean problems. *EduMa: Mathematics Education Learning And Teaching*, *13*(2), 165–182. https://doi.org/10.24235/eduma.v13i2.18719

Sari, I. K., Nasriadi, A., Amalia, Y., Musfiya, M., & Setiawati, F. A. (2023). Middle school students' mathematical representational ability: a case study of the development of students' cognitive ability through the realistic mathematics education approach. *Mosharafa: Jurnal Pendidikan Matematika*, *12*(3), 453–464. https://doi.org/10.31980/mosharafa.v12i3.2556

Serin, H. (2018). The use of extrinsic and intrinsic motivations to enhance student achievement in educational settings. *International Journal of Social Sciences & Educational Studies*, *5*(1), 191–194. https://doi.org/10.23918/ijsses.v5i1p191

Sholeha, H. H., Pujiastuti, P., & Mardati, A. (2022). Analysis of mathematical connection ability to students' learning motivation in advanced mathematics courses. *AL-ISHLAH: Jurnal Pendidikan*, *14*(2), 2065–2074. https://doi.org/10.35445/alishlah.v14i2.795

Siagian, T. A., Agustinsa, R., & Zianti, C. H. (2022). Students' mathematical connection ability in solving circle problems based on gender and learning motivation perspectives. *Jurnal Pendidikan MIPA*, *23*(4), 1683–1699. https://doi.org/10.23960/jpmipa/v23i4.pp1683-1699

Sugiyono. (2015). *Metode Penelitian Pendidikan : Pendekatan Kuantitatif, Kualitatif dan R&D* (21st ed.). Alfabeta.

Sulistiyowati, L., & Wahyuni, I. (2024). Mathematical connection skills of junior high school students in solving system of linear equations in two variables problems. *Research and Development in Education (RaDEn)*, *4*(2), 876–894. https://doi.org/10.22219/raden.v4i2.36021

Suparti, S., & Netriwati, N. (2021). The MASTER (motivating, acquiring, searching, triggering, exhibiting, reflecting) learning model based on edutainment and motivation: the impact and interaction on mathematical connections skills. *Journal of Advanced Sciences and Mathematics Education*, *1*(1), 7–13. https://doi.org/10.58524/jasme.v1i1.5

Tririnika, Y., Sujadi, I., & Slamet, I. (2024). In-depth analysis of students ' mathematical problem-solving skills: influence factors motivation and effective teaching strategies. *Al-Ishlah: Jurnal Pendidikan*, *16*(3), 3752–3766. https://doi.org/10.35445/alishlah.v16i3.5474

Ulya, I. F., Irawati, R., & Maulana. (2016). Peningkatan kemampuan koneksi matematis dan motivasi belajar siswa menggunakan pendekatan kontekstual. *Jurnal Pena Ilmiah*, *1*(1), 121–130. https://ejournal.upi.edu/index.php/penailmiah/article/view/2940

Utami, C. (2022). Kemampuan pemahaman konsep matematis berdasarkan motivasi belajar siswa di masa Pandemi. *JUMLAHKU: Jurnal Matematika Ilmiah STKIP Muhammadiyah Kuningan*, *8*(1), 156–165. https://doi.org/10.33222/jumlahku.v8i1.1441

Xia, Q., Yin, H., Hu, R., Li, X., & Shang, J. (2022). Motivation, engagement, and mathematics achievement: an exploratory study among Chinese primary students. *SAGE Open*, *12*(4), 1–13. https://doi.org/10.1177/21582440221134609

Yanto, A., Amam, A., & Sunaryo, Y. (2022). Analisis kemampuan koneksi matematis siswa dalam menyelesaikan masalah konstektual. *J-KIP (Jurnal Keguruan Dan Ilmu Pendidikan)*, *3*(2), 414. https://doi.org/10.25157/j-kip.v3i2.6556

Zhang, Y., Yang, X., Sun, X., & Kaiser, G. (2023). The reciprocal relationship among Chinese senior secondary students' intrinsic and extrinsic motivation and cognitive engagement in learning mathematics: a three-wave longitudinal study. *ZDM - Mathematics Education*, *55*(2), 399–412. https://doi.org/10.1007/s11858-022-01465-0