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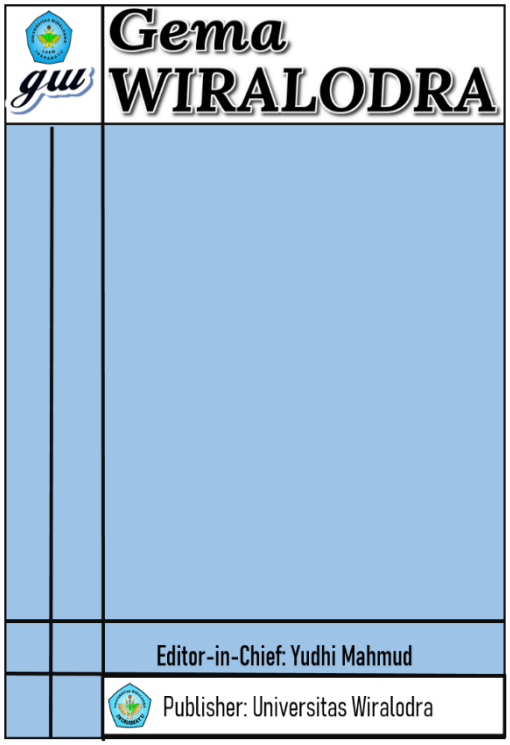

Literature Review: The Ability of Mathematical Connection to Learning Outcomes

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Orginal Article

Literature Review: The Ability of Mathematical Connection to Learning Outcomes

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Abstract
This study aims to analyze students' mathematical connection abilities through the Systematic Literature Review (SLR) approach. The main focus of the study is to identify the influence of learning strategies such as Problem-Based Learning (PBL), Realistic Mathematics Education (RME), and project-based learning on mathematical connection skills. This study analyzed 11 articles published in the 2022–2024 time frame. The results of the review show that innovative learning approaches, such as PBL and RME, have a significant positive impact on improving students' mathematical connection skills. Factors such as motivation, mathematical resilience, and learning environment were also found to be important elements influencing the success of the strategy. In addition, these results provide practical recommendations for teachers to integrate mathematical connections in the learning process as well as encourage further research on the influence of technology, culture, and socio-economic conditions on mathematical connection ability. This research is expected to contribute to the development of a more relevant, effective, and applicable mathematics curriculum to improve the quality of mathematics learning holistically
Keywords: Literature Review, Connection Mathematics, Learning Outcomes

1. Introduction

Mathematics, as the underlying science in various areas of life, is often seen as a fragmented and difficult subject for students to understand (Noor Afniandari et al., 2021; Siregar et al., 2023; Utami et al., 2020). Conventional mathematics learning, with a focus on memorizing formulas and solving standard problems, often fails to build a complete understanding of the concepts and students' interest in learning. As a result, many students have difficulty applying mathematics in real life and find it irrelevant(Mazana et al., 2018).

This understanding gap arises due to a lack of mathematical connection skills, students' ability to relate mathematical concepts and procedures to each other, as well as to real-life contexts (Dewi & Nurjanah, 2022). Students often learn mathematical concepts separately without understanding the relationships between concepts and their implications in various situations (Khairani Lubis et al., 2024). This causes difficulties in solving complex problems and reduces students' motivation to learn. In the last few years, articles about the use of mathematical connections in students have used various methods. Such as the use of PBL (Problem based learning), SLR (self directed learning), and project-based assignments.

This article uses the Systematic Literature Review (SLR) Method to present a review of the use of Mathematical Connections to make a significant contribution in several aspects in the 2022-2024 vulnerability obtained from 11 articles obtained. Exploring more comprehensive information about mathematical connections based

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on various previous researches, thus providing a strong foundation for future research.

The research using the Systematic Literature Review (SLR) method can also identify and analyze factors that affect the ability to make mathematical connections, both internal (cognitive, motivational) and external (learning strategies, learning environment). As well as evaluating the effectiveness of various learning strategies that have been implemented to improve mathematical connections, such as PBL, project-based learning, and cooperative learning

2. Method

This literature study search is carried out on the Google Scholar database using the Publish or Perish application. Google Scholar is a service on Google that indexes articles published in scientific journals and can be used to find relevant article sources because it contains articles indexed by Google Scholar based on the required publication year range.

3. Results and Discussion

It	Author's Name & Year	Journals & Volumes	Result
1	Risma Firda Diana, Lootyon Noordiyanah (2022)	AKSIOMA: Jurnal Program Studi Pendidikan Matematika Volume 11, No. 4, 2022, 3744-3756	Based on the findings during the study, an allocation is needed in accordance with the project specific projects. Online learning will become more interesting with the PjBL-based module. In addition, modules can also be developed and created according to all courses/subjects (Diana & Nurdianah, 2022).
2	Siti Aisyah, Dadang Juandi, Al Jupri (2022)	AKSIOMA: Jurnal Program Studi Pendidikan Matematika Volume 11, No. 2, 2022, 1009-1018	Overall, it can be concluded that The implementation of the PBL model has a positive impact compared to direct learning on students' mathematical connection skills(Aisyah et al., 2022).
3	Muliana, Cut Azura, Rohantizani(2022)	Jurnal Dedikasi Pendidikan, Vo. 6, No. 2, July 2022 : 503-514	Improved mathematical connection capabilities of students who get a better PBL model of the scientific approach in class VIII SPLDV material for SMP Negeri 1 Matangkuli. Thus, the researcher drew the conclusion that the model

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			pembelajaran problem based learning get improve mathematical connection skills grade VIII students of SMP Negeri 1 Matangkuli (Muliana et al., 2022).
4	Sayidan Amrizal Fikri, Reni Untarti(2022)	Journal MATH-UMB.EDU Vol 9, (3), Year 2022	Students who have a moderate interest in learning mathematics are able to connect the mathematical concepts that have been learned with the concepts mathematics that is being studied, and able to Mathematics connects with conceptual problems in everyday life. However, students have not been able to relate mathematical concepts to other disciplines besides mathematics. Students who have a low interest in learning mathematics are able to connect mathematics with concept problems in everyday life. Students have not been able to connect the mathematical concepts that have been learned with the mathematical concepts that are being studied, and Students are not able to relate mathematical concepts to other disciplines besides mathematics(Untarti & Sayidan, 2022).
5	Farhan Nurul Imam, Darhim(2023)	Jurnal Cendekia: Jurnal Pendidikan Matematika Volume 07, Number 02, April - July 2023, pp. 2072-2082	The mathematical connection ability of students who have high mathematical resilience is much better with the mathematical connection ability of students who have medium and low resilience. It Because students who have high resilience can face any challenges that exist

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			in problems and working hard with the confidence they have to solve problem. Lack of mathematical connection skills in students with medium and low resilience caused by poor understanding of students' concepts of the given questions, lack of student understanding of the problems given, lack of student knowledge about the subject matter being tested, and students are unable to turn the problem story into mathematical models as well as students cannot solve problems(Nurul Imam & Darhim, 2023).
6	Erlinda Rahma Dewi, Arifta Nurjanah (2022)	Jurnal Riset Pendidikan Matematika Vol 9 No. 2	There was no significant difference between learning using Problem Based Learning (PBL) and Case Based Learning (CBL). Need to reconstruct proper learning to foster mathematical connection skills. (Dewi & Nurjanah, 2022)
7	Fery Mohamad Firdaus, Aqila Shofia Afani, Nadia Nur Utami, Resta Al Mega(2022)	JMIE (Journal of Madrasah Ibtidaiyah Education), 6(1), 2022, 32-49	The results of the analysis and discussion can be concluded as follows: 1) *the Realistic Mathematics Education* (RME) learning model has a significant effect on students' mathematical connection ability to the building materials of the limus room; 2) there are Differences in mathematical connection abilities between groups taught using the model *Realistic Mathematics Education* (RME) with groups taught using the model conventional learning(Firdaus et al., 2022).

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8	Navel Octaviandy Mangelep, Goodbye Mahniar, Karen Noorvi wins, Ahmad Sofi Yullah, Lovryk Ochdrico Lahunduitan(2024)	Journal of Education and Teaching Review, Volume 7 Number 2, 2024	Students' difficulties in dealing with problems Mathematics, particularly in trigonometric material, involves several factors. Several factors which can affect students' difficulties include a lack of understanding of concepts basics, difficulties in applying problem-solving strategies, anxiety about mathematics, and lack of confidence. It is important for educators to understand the factors factors and provide an appropriate approach to help students overcome their difficulties. One approach that can be used is the understanding approach trigonometric material connection. Mathematical connection ability, i.e. the ability to associate between concepts in a mathematical material, can help students build a deeper understanding of mathematics(Mangelep et al., 2024).
9	Muh Ganjar Lugina, Yuni Artiani(2022)	Journal of Educational Professions (JPP) Volume 1, Number 1, June 2022	The research that has been carried out gives an idea that the mathematical connection skills possessed by students are diverse. Based on the results of the pretest, the initial ability of students in the experimental and control classes has been different. The mathematical connection ability of students in the experimental class was relatively higher compared to the control class. After different treatments were carried out in the two classes, the average N-gain of the

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			experimental class was higher than that of the control class. This means that the improvement of connective mathematical ability in the experimental class is higher. This is strengthened by the statistical data of the U-test (Mann-Whitney) obtained the result of P-value (Sig.1-tailed) = 0.000. Thus, the P-value (Sig.1-tailed) < α = 0.05, so that learning using a realistic mathematical approach is significantly better in improving the mathematical connection ability of elementary school students than learning using a conventional approach(Ganjar Lugina & Artiani, 2022).
10	Ulfa Fadhilatul Mufidah, Isnaeni Umi Machromah(2023)	Jurnal Cendekia : Jurnal Pendidikan Matematika Volume 07, Number 02	Based on the above explanation, if students have mathematical skills in terms of connection At a moderate level, students will experience an increase in the achievement of indicators, but students are not right in solving problems. In line with the findings of Hamdani & Nurdin (2020), which suggests that students with moderate category math skills are in the connection mathematically able to solve problems to the end but still experience errors in calculations and difficulties in determining formulas so that students fail to answer correctly. In addition, according to the research of Rochmawati et al (2020), students with intermediate mathematical skills in mathematics can complete the

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			task to completion, but there are still errors in writing equations so that the answers worked on are not correct(Mufidah & Machromah, 2023).
11	Paojiah, Turmudi, Puji Rahayu(2023)	Scientific Journal of Realistic Mathematics (JI-MR) Vol. 4, No. 2, December 2023, 204-211	Based on the results of research that has been conducted by researchers regarding the application of the realistic mathematics education learning model to improve the mathematical connection ability of elementary school students, it can be concluded that the realistic mathematics education learning model can increase student learning activities(Paojiah et al., 2023).
12	Riri Indriani, Teni Sritresna	Plusminus: Journal of Mathematics Education, Vol. 2, No. 1, March 2022	Based on the results of the research and discussion, it can be concluded that students who have low self-efficacy have high mathematical connection ability, students who have medium self-efficacy have very high mathematical connection ability, and students who have high self-efficacy have very high mathematical connection ability(Indriani & Sritresna, 2022).

Recommendations

This research using the *Systematic Literature Review* (SLR) method can provide practical recommendations for the development of a mathematics curriculum that emphasizes more on connections between concepts, real-life applications, and the development of higher-level thinking skills. It can also provide guidance for teachers on effective learning strategies to improve students' mathematical connection skills, based on findings from literature analysis.

Identify Research Gaps

This research can identify research gaps that still need to be studied further, such as the development of new and more effective learning strategies to improve mathematical connections. There are also several factors that affect mathematical

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connections, but they have not been researched. Such as influencing culture, technology, or socio-economic conditions on the ability to make mathematical connections.

Improving the Quality of Mathematics Learning

By understanding the connections between concepts, students can build a more holistic and in-depth understanding of mathematics. The ability to connect mathematics helps students in applying mathematical knowledge to solve complex and real problems. Mathematics learning that emphasizes connections and applications can increase students' interest in learning and reduce negative perceptions of mathematics.

Thus, this research article using the *Systematic Literature Review* (SLR) method regarding mathematical connections can make an important contribution to the development of more effective and meaningful mathematics learningHatisaru, 2023; Kleden et al., 2021), both for teachers, researchers, and students.

4. Conclusion

The Systematic Literature Review (SLR) approach is used in this study to examine how different learning styles affect students' mathematical connection skills. The analysis of 11 papers from 2022 to 2024 demonstrates that cutting-edge strategies like Realistic Mathematics Education (RME) and Problem-Based Learning (PBL) significantly enhance students' ability to make mathematical connections. The learning environment, motivation, and mathematical resilience are other elements that affect how well these tactics work. This study also emphasizes how crucial it is to incorporate mathematical connections into the educational process and suggests more research on how socioeconomic circumstances, culture, and technology affect mathematical connection skills. It is anticipated that these findings will aid in the creation of a more adaptable and successful mathematics curriculum, improving the general standard of mathematics education.

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