Efektivitas Model Pembelajaran dalam Meningkatkan Pemahaman Konsep Matematika Siswa

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Abstrak: Penelitian ini bertujuan untuk menganalisis efektivitas berbagai model pembelajaran dalam meningkatkan pemahaman konsep matematika siswa. Dengan menggunakan metode systematic literature review, penelitian ini mengkaji artikel-artikel ilmiah yang relevan dari tahun 2019 hingga 2024. Hasil penelitian menunjukkan bahwa model pembelajaran seperti Contextual Teaching and Learning (CTL) dan pembelajaran kooperatif, termasuk strategi seperti STAD dan Jigsaw, terbukti signifikan dalam meningkatkan hasil belajar siswa. Selain itu, integrasi teknologi pendidikan melalui sumber daya digital dan platform interaktif turut memperkaya pengalaman belajar dan meningkatkan motivasi siswa. Temuan ini menegaskan pentingnya pemilihan model pembelajaran yang tepat serta penyesuaian dengan kebutuhan siswa untuk mencapai hasil belajar yang optimal. Penelitian ini diharapkan dapat memberikan wawasan dan rekomendasi bagi para pendidik dalam merancang strategi pembelajaran yang efektif dan inovatif.

Kata Kunci: *Model Pembelajaran, Pemahaman Konsep Matematika*

Effectiveness of Learning Models in Enhancing Students' Mathematical Concept Understanding

Abstract: *This study aims to analyze the effectiveness of various learning models in improving students' understanding of mathematical concepts. Using the systematic literature review method, this study explores relevant scientific articles from 2019 to 2024. The results show that learning models such as Contextual Teaching and Learning (CTL) and cooperative learning, including strategies such as STAD and Jigsaw, have been proven to be significant in improving student learning outcomes. In addition, the integration of educational technology, through digital resources and interactive platforms, enriches the learning experience and increases student motivation. These findings emphasize the importance of choosing the right learning model and adapting to the needs of students to achieve optimal learning outcomes. This research is expected to provide insights and recommendations for educators in designing effective and innovative learning strategies.*

Keywords: *Learning models, Understanding mathematical concepts*

INTRODUCTION

In the era of modern education, understanding mathematical concepts is one of the key indicators of student success in learning. Mathematics is not just arithmetic, but also a basis for developing critical thinking skills and problem solving.(Pasaribu & Ritonga, 2019). Therefore, it is important for educators to apply effective learning models in teaching mathematical concepts. Various studies show that the right learning model can improve students' understanding of the material being taught.

This literature aims to explore and analyze current research on effective learning models in improving students' understanding of mathematical concepts. Using a systematic literature review approach, this study will review relevant scientific articles and identify

various learning models that have been proven successful in the context of mathematics education. The results of this study are expected to provide insight for educators in designing more effective learning strategies that are in accordance with students' needs.

In recent years, there has been significant development in research on effective learning models to improve understanding of mathematical concepts. Various learning models such as Contextual Teaching and Learning (CTL), Cooperative Learning, and the use of educational technology have been identified as successful strategies in improving student learning outcomes. a) Contextual learning model (CTL), research shows that CTL helps students relate mathematical concepts to real-world situations, which increases their motivation and understanding. This model emphasizes the importance of relevant and applicable learning experiences. b) Cooperative Learning, many studies highlight the effectiveness of cooperative learning models in increasing interaction between students. By working together in groups, students can help each other and explain concepts to each other, which strengthens their understanding. c) Use of Technology, educational technology, including learning software and applications, has been shown to increase engagement and interactivity in mathematics learning. These tools allow students to learn independently and adjust their learning pace. d) Differentiated Approach, Recent research also shows that models that allow for differentiation in instruction can meet the needs of diverse students, thereby improving understanding of mathematical concepts. Thus, this study not only highlights the importance of effective learning models but also underlines the need for technology integration and differentiation approaches in mathematics education. The findings of these studies will be organized and analyzed to provide useful recommendations for educational practitioners.

This research has important value in the context of elementary education, especially in mathematics learning. By understanding effective learning models, educators can improve the quality of teaching and student learning outcomes. In addition, this research can be a reference for further research in the field of education and curriculum development.

The urgency of this research lies in the need to improve students' understanding of mathematical concepts. With the challenges faced in learning mathematics, such as students' difficulties in understanding basic concepts, this research seeks to provide solutions that can be practically implemented in the classroom. In addition, in today's digital era, the integration of technology in learning is also an important factor that needs to be explored further.

The hypothesis proposed in this study is that there is a positive influence between the application of effective learning models on students' understanding of mathematical concepts and the integration of technology in learning models will improve understanding of mathematical concepts compared to traditional methods. Thus, this study is expected to provide a significant contribution to the development of learning models that focus on improving students' understanding of mathematical concepts.

METHODS

Research Design

This study is a systematic literature review (Khalaf & Zin, 2018). The purpose of the study is to critically analyze the Effective Learning Model to Improve Students' Understanding of Mathematical Concepts in social science and education research articles. According to Martins and Gorschek (2016), inclusion criteria strongly constrain the process of conducting a systematic literature review.

Inclusion Criteria

General traits of research participants from the enlarged target group under study are known as inclusion criteria (Ahn & Kang, 2018). Research articles that concentrate on learning models or comprehending mathematical concepts, research with 20 or more

respondents, and research publications published are the inclusion criteria for this study in online journals between 2019-2024.

Tracking and Filtering Techniques

Online sources such as Sinta, Google Scholar, Scopus, ERIC, and other indexed journal databases were searched for literature pertaining to study data in accordance with inclusion criteria. Student learning outcomes and interest are the keywords that are tracked. The title of the study, the researcher's name, the year of publication, the sample size, the research methodology, and the research findings are the key components that are considered research data (articles). We employ the systematic review and meta-analysis approach (PRISMA) to screen and review this literature (Selcuk, 2019). Figure illustrates the PRISMA diagram and the literature review procedure.

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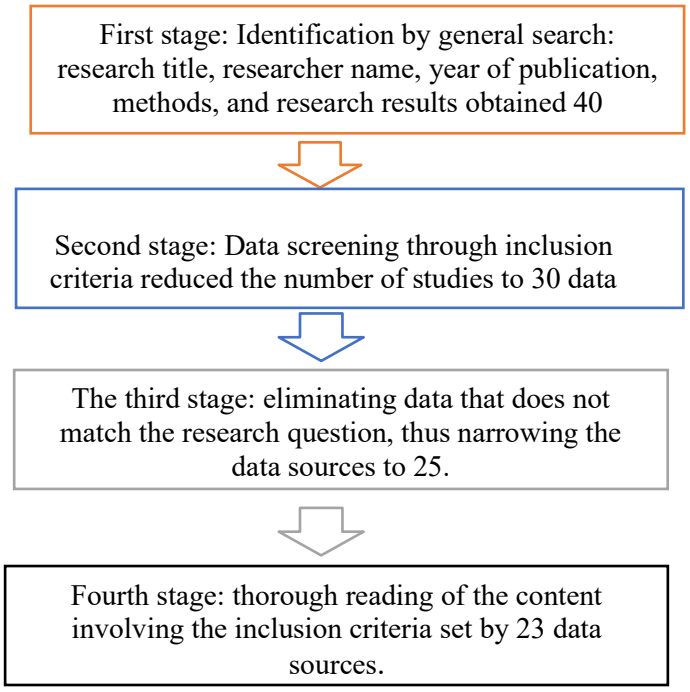

Figure 1 Data Filtering

Data analysis

Data extraction is the method of data analysis used in this systematic review study. All research data gathered from scientific journals utilized for research is taken and used for data extraction. By separating the data into multiple categories, researchers transform the collected data into new data (Mathes et al., 2017; Schmidt et al., 2021). Researchers only take valid data and do not include less valid data so that optimal new data and satisfactory results are obtained. All data taken from journal searches are extracted according to the research objectives. The data is entered into the data extraction form and displayed in table form(Popenoe et al., 2021).

Data Synthesis

Data (including articles) were compiled in an organized fashion utilizing narrative techniques for this systematic literature review study. Mathes and colleagues (2017). In order to address the research objectives, narrative synthesis is carried out by classifying the extracted (similar) data based on the measured outcomes. Harden and Thomas (2008). After gathering the evidence, it is compared and contrasted, and conclusions are reached through discussion Munn et al. (2014).

FINDINGS AND DISCUSSION

Findings

This table presents data on research related to understanding mathematical concepts and learning models from 2014 to 2023. The table is divided into several columns that describe the research area, year of publication, number of articles published, and relevant references.

Research Areas	Publication Year	Number Of Papers	References
Understanding Mathematical Concepts	2019 2020 2023	12	(Yuniati et al., 2020),(Rane, 2019),(Eriana et al., 2019),(Danial, nd),(Zaiyar et al., 2020),(Wang et al., 2021),(Farida & Renaldo, 2021),(Wigati et al., 2023),(Susanto et al., 2021),(Deliyianni et al., 2021),(Salsabila, 2019),(Jazuli et al., 2023),
Learning model	2019 2022	6	(Virgana, 2019),(Arlavinda & Anriani, 2022),(Nasution & Hafizah, 2020),(Yenti et al., 2023),(Winda Anggriyani Uno, 2024),(Amin & Mulyono, 2022),
Technology in Learning	2014 2019 2020	5	(Andriani et al., 2024),(Nazirah et al., 2021),(Septy et al., 2019),(Amergus et al., 2021),(Sahara et al., 2023)
Total Articles		23	

Discussion

This table provides a clear picture of the development of research in the field of mathematics education, especially regarding the effectiveness of learning models and technology in improving students' understanding of mathematical concepts. This data can be a reference for educators and researchers to design more effective learning strategies**.**

In the discussion of this literature review, there are 3 main points discussed, including the effectiveness of cooperative learning models, the role of understanding mathematical concepts in improving student achievement or in everyday life, and how learning technology relates to students' understanding of mathematical concepts.

Cooperative learning models have been proven effective in improving students' understanding of mathematical concepts. Based on the results of the journal review that has been discussed, several cooperative learning models that show their effectiveness are a) STAD (Student Teams Achievement Divisions), This model involves students in small groups who work together to achieve learning goals. The results of the study showed that the application of the STAD model can significantly improve students' understanding of mathematical concepts. By using worksheets and tests, students experienced an increase in conceptual understanding scores after the application of this model(Yenti et al., 2023). b) Jigsaw, The Jigsaw model requires students to become experts in one part of the material and then teach that part to their group mates. Research shows that this model can encourage

collaboration and mutual teaching among students, which contributes to a deeper understanding of mathematical concepts.(Rane, 2019). c) Cooperative Learning with Worksheets, The use of worksheets in cooperative learning has also been proven effective. In several studies, students who learned using worksheets in groups showed significant improvements in understanding mathematical concepts compared to traditional learning methods.(Arlavinda & Anriani, 2022; Virgana, 2019). d) Learning Together, This model emphasizes cooperation between students in completing tasks together. Research shows that this model can improve students' motivation and learning outcomes, as well as strengthen their understanding of mathematical concepts through group discussions. e) Think-Pair-Share, This model involves students thinking individually, discussing with a partner, and then sharing ideas with a larger group. This helps students to clarify their understanding and gain different perspectives, which are important for better understanding of concepts. Cooperative learning models such as STAD, Jigsaw, and worksheet-based learning have been shown to be effective in improving students' mathematical concept understanding abilities.(Eriana et al., 2019). By encouraging interaction and collaboration between students, these models not only improve learning outcomes but also strengthen students' social and communication skills. Therefore, the application of these models in mathematics learning is highly recommended to achieve optimal results.

A strong understanding of mathematical concepts is the foundation for higher-level learning. Students who have a good understanding of basic mathematical concepts, such as arithmetic, geometry, and algebra, will find it easier to understand more complex concepts. This is especially important in other subjects that integrate mathematics, such as physics, chemistry, and economics. Mathematics is not just about numbers, but also about problem solving. Students who understand mathematical concepts are able to apply their analytical skills to solve everyday problems. For example, when faced with financial problems, such as budgeting or investing, understanding mathematical concepts can help students make better decisions. Several studies have shown that a good understanding of mathematical concepts is positively related to academic achievement. Students who understand basic concepts tend to score higher on tests and assignments. This also has an impact on students' self-confidence, which in turn encourages them to perform better in other areas. Mathematics teaches students to think critically and logically. In the process of understanding mathematical concepts, students are trained to analyze information, draw conclusions, and make decisions based on evidence. These skills are invaluable not only in academic contexts but also in everyday life, where students need to make rational, data-driven decisions. Many professions in the modern world require a strong understanding of mathematics. Fields such as engineering, computer science, economics, and data science rely heavily on math skills. By having a good understanding of mathematical concepts, students are prepared to enter the increasingly competitive workforce. Understanding mathematical concepts is also very useful in everyday life. Students who understand mathematics can more easily manage personal finances, create budget plans, calculate discounts when shopping, or even understand statistics in the news. These skills improve their ability to make better decisions in everyday life.

Learning technology plays an important role in improving students' understanding of mathematical concepts. The following are several points that explain the relationship between the two: a) Access to various learning resources, learning technology provides access to various resources, such as learning videos, interactive applications and online platforms. Students can explore mathematical concepts through visual and audio media that clarify their understanding. For example, animations that explain geometry concepts can help students understand shape and space better. b) Interactive and Practical Learning, with technology, students can engage in interactive learning that encourages exploration and practice. Math software programs and mobile applications allow students to solve problems directly, get

instant feedback, and learn from their mistakes. This interaction deepens understanding of mathematical concepts. c) Increased Motivation and Interest in Learning, the use of technology in learning can increase student motivation. Interactive tools and gamification make learning mathematics more interesting and fun. When students are more engaged and motivated, they tend to focus more and put more effort into understanding the concepts being taught. d) Personalization of Learning, technology enables personalized learning, where students can learn according to their own pace and learning style. For example, adaptive learning platforms can adjust material and difficulty levels based on student progress. This approach helps students with varying levels of understanding to acquire mathematical concepts effectively. e) Using Data to Analyze Understanding, learning technology also allows for the collection of data on student progress. With data analysis, teachers can identify areas where students are having difficulty and provide interventions that right. It helps in directing teaching efforts to improve students' understanding of mathematical concepts. f) Online Collaboration and Discussion, technology supports collaboration among students through online forums and discussion platforms. Students can discuss and share their understanding of mathematical concepts, help each other in solving problems. This collaboration strengthens understanding through social interaction and shared learning. The relationship between learning technology and students' understanding of mathematical concepts is very close. By providing diverse resources, facilitating interactive learning, and enabling personalization, technology can enhance students' understanding of mathematical concepts. Therefore Therefore, technology integration in mathematics education is highly recommended to achieve better learning outcomes.

Teachers have a very important role in helping students understand mathematical concepts. Here are some aspects of the teacher's role in this context: a) Mature Learning Planning, b) Providing clear explanations, c) Applying active learning methods d) Providing conducive feedback e) Using a variety of learning resources, f) Encouraging independent learning, g) Building a positive learning environment, h) Developing critical thinking skills, i) Being a role model. The role of teachers in improving students' understanding of mathematical concepts is very diverse and crucial. With good planning, active teaching methods, and consistent support, teachers can help students develop a deep understanding and mathematical skills needed for academic and daily life success

CONCLUSION

This study emphasizes the importance of implementing effective learning models in improving students' understanding of mathematical concepts. Through a systematic literature review, it was found that various learning models, such as Contextual Teaching and Learning (CTL) and cooperative learning, have a significant positive impact on students' understanding. In addition, the integration of technology in the learning process has been shown to increase student engagement and facilitate a more interactive learning experience. Thus, choosing the right learning model and adapting to students' needs is the key to achieving optimal learning outcomes.

It is expected that educators can apply learning models that have been proven effective in this study. Adaptation of methods according to student characteristics is highly recommended. Educators are advised to make maximum use of educational technology, by providing training for teachers and students in the use of digital tools and resources. Educational institutions need to consider developing curricula that support the implementation of innovative learning models, as well as providing adequate resources. Further research is needed to explore more deeply the factors that influence the effectiveness of learning models in different contexts, as well as to test the hypotheses proposed in this study. Encouraging collaboration between educators in sharing best practices and experiences

in implementing learning models can improve the overall quality of education.

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