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## **Effectiveness of the Use of Media and Learning Models in Improving Students' Mathematical Communication Skills: *Systematic Literature Review***

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### **Abstract**

SLR is researched to describe and find out the level of students' numerical communication capacity. Several parties have utilized a variety of learning materials and learning models to achieve the desired goals. The purpose of this study is to find out which learning tools and models can increase the scientific capacity of students. This question is divided into two tables, namely the media table and the strategy table. Analysts use proper writing audit frameworks to investigate existing diries. From the important articles, it can be concluded that a typical learning model can be utilized in learning materials aimed at supporting the advancement of scientific communication skills.

**Keywords:** mathematical communication skills, learning media, learning models

### **Introduction**

The word "math" comes from the Latin word "math", which comes from the Greek. Math is about learning. The word "mathematics" comes from the Greek word "mathema" which means "knowledge" or "science". Mathematics is used in various fields and can be found at all levels of education (Permatasari, 2021). Mathematics is essential in many areas of our lives, such as calculations, measurements, and many other things (Nur, 2022). "Mathematics can be used to develop systematic, logical, creative, disciplined thinking skills and effective collaboration in today's competitive society. This can be defined as the skill of creative, disciplined, and collaborative thinking effectively to solve mathematical problems using various solutions, thus allowing students to develop systematic, logical, creative, disciplined, and collaborative thinking skills that effectively think fluently, flexibly, complicatedly, and have their own answers (Marliani, 2015). Teachers can improve their mathematical representation skills in several ways. While it is very important to choose a

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learning strategy, method, approach, or model, it is also very important to choose the tasks assigned to students. These tasks require students to think, reason, deduce, interpret, make correlations, and reason about mathematical concepts and ideas. Such assignments encourage students to solve problems and create more complex representations (Yuniarti, 2013). According to the Ministry of Education and Culture in 2013, the purpose of mathematics learning is to improve intelligence, solve problems, achieve high learning outcomes, improve communication skills, and develop students' personalities (Purnawati, 2015).

The achievement of student learning goals requires effective communication both during online and offline learning. Online learning requires teachers and students to understand and utilize technology to share information without being tied to face-to-face relationships or real-time environments. Offline learning allows students to meet and communicate face-to-face with teachers simultaneously in the same environment (Darmawati et al., 2022). Students must have mathematical communication skills when studying. Greens and Schulman believe that mathematical communication is (1) a source of strength for students to develop mathematical problem-solving concepts and strategies, and (2) mathematical exploration to find approaches and problem-solving as well as resources for students in research, (3). A platform for students to communicate with friends, discover, brainstorm, evaluate, and hone ideas. (Ahmad, M., Nasution, DP, 2018). Students need numeracy and language skills to learn math. Language skills are a person's skills that are expressed both orally and in writing and consist of words that can be used to convey information and give or receive information. All subjects, including mathematics, depend on language skills (Riani, N. K., Husna, A. & Gusmania, Tahun, 2022).

During the process of learning mathematics, students can be considered proficient in five aspects of mathematical communication: (reading), (writing), (listening), (discussion), and representation (Arfah, U., & Effendi, K. N. S, 2022).

### **Literature Review**

Learning media has become an integral part of the mathematics learning process. In a study conducted by Smith and Boyes (2017), the use of interactive media such as simulation software has been shown to be effective in improving students' understanding of mathematical concepts and communication skills. Similarly, research by Johnson (2018) highlights the benefits of using learning videos in helping students explain the process of solving math problems more clearly.

Learning models such as problem-based learning and cooperative learning have received great attention in the context of improving students' mathematical communication skills. Research by Sholeh et., al (2020) shows that problem-based learning significantly improves students' ability to formulate and explain mathematical solutions systematically. In addition, a study by Jaya et., al (2019) revealed that after problem-based learning can make students more confident and students' ability to present mathematical thinking more clearly.

Research conducted by Chen et al. (2021) explores how the use of interactive media can be improved through integration with problem-based learning models. The results of this study show that this combination of media and learning models significantly improves students' ability to communicate mathematically.

## **Research Method**

The Systematic Literature Review (SLR) approach is applied in theoretical studies. Five stages are listed by Khan, Kunz, Kleijnen, and Antes (2003) to conduct a literature review. Formulate research questions; (2) Conduct an article search; (3) Evaluate articles; (4) Write an article summary; and (5) Interpreting the conclusion of the paper.. The search for research papers and literature is carried out from the perspectives of: (1) The use of learning media to improve students' mathematical communication skills; (2) The use of mathematics learning models to improve students' mathematical communication skills; Library sourcing searches are conducted using Google Scholar, Researchgate, and ERIC databases. Currently, the tips used in finding library resources are: concrete mathematics learning media, digital mathematics learning media, effective learning models. After completing the research, *the research* evaluated the results of the search for library sources. The literature is sorted based on special criteria to determine the source articles of the literature in *this study*. These criteria are: (1) Literature according to certain aspects, (2) Articles and literature of literary magazines published from 2017 to 2020. (4) Literature in the form of journal articles is entirely available to the public or procedural products.

## **Result/Findings**

The findings of journal articles are in the form of literature reviews, namely analysis and summary of various sources of information on learning media topics presented in Table 1 below.

Table I: Learning Media

Researcher, Year	Research Results
Hestu, 2021	There was a positive and significant relationship between students' mathematical capacity and mathematical problem-solving skills.
Jusniani, 2021	The application of generative learning models can improve students' mathematical communication skills.
Robiana, 2020	The use of Unomath media improves mathematical communication skills.
Mahadewi, 2020	Mathematical communication skills can be improved through reciprocal teaching models supported by interactive media.
Narsullah, 2015	The use of Edmodo media is effective in improving mathematical communication in business mathematics learning.

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As seen in Table I, various types of learning media, such as generative learning, Unomath media, Emodo media, and other interactive media, can help students improve their mathematical communication skills and improve their communication skills. Research shows that the above factors help students improve their mathematical communication skills.

Therefore, this may be supported by several journal articles related to the learning model in Table II below.

Table II: Learning Model

Researcher, Year	Research Results
Yanti, 2017	Compared to traditional learning models, problem-based learning models improve mathematical communication skills.
Sartika, 2017	Students' mathematical communication skills are influenced by the application of the learning model
Jaya et al., 2019	After using the problem-based learning pen model, students become more confident and mathematical communication is better.
Sholeh et al., 2020	Based on the results of the research, the application of the problem-based learning model can improve students' mathematical communication skills.
Br. Sembiring & Siregar, 2020	LKPD learning tools are based on the Discovery Learning model to implement students' mathematical communication skills effectively and practically.

Based on Table II above, there are five studies that use a problem-based learning system. This research method requires students to actively participate in the learning system and solve learning problems rather than passively. Among the various studies that have been conducted, I am interested in research that shows that mathematical communication can be improved. The study concluded that "this audiovisual medium can be an effective learning tool and with some proper experimentation and adjustment, it can help students understand the material, thereby improving their mathematical communication skills. I guess that's what it's called. Learning activities for each meeting.

### **Conclusion**

The skill that students need to have during Mathematics class is the skill of communicating Mathematically. These skills enhance and ensure understanding through the process of verbal exchange of ideas and opinions. From this study, it can be concluded that different media or teaching models affect students' mathematical communication skills. Various learning models and media are designed to effectively improve students' mathematical communication skills.

Researchers suggest that problem-based learning can improve the learning process of students' mathematical communication skills. Audiovisual media can be used more effectively as a learning medium. And researchers can then develop and maintain video blogs for mathematics education by conducting more detailed studies of the context, appearance, content, tools used, and video blogs.

### **Declaration of conflicting interest**

The authors declare that there is no conflict of interest in this work.

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