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LITERATURE REVIEW: THE IMPACT OF DISTANCE LEARNING ON STUDENTS' MATHEMATICAL PROBLEM SOLVING SKILLS

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ABSTRACT

This study was intended to analyze the impact of distance learning on students' ability to solve math problems. Using the literature search method, this research was carried out by analyzing a range of types of information in qualitative and quantitative data from various texts based on previous studies. The literature exploration system uses a variety of references similar to books, exploration journals, and distance literacy operation modules that analyze students' mathematical problem-solving skills. The results of this study validate that distance learning can affect students' mathematical problem-solving skills when teachers use innovative methods and interactive learning media. In fact, students can develop their mathematical problem-solving skills through meaningful learning. This means that students can build their own knowledge with learning that requires independent study on the part of students so that they can construct conceptual discoveries from the material being taught. Students' mathematical problem-solving skills can also be affected by the active role played by students in distance learning. For this purpose, it is necessary for educational institutions to apply appropriate methods of learning and media that allow students to have an active role in the educational process. In addition, educational institutions must strive to provide effective and efficient communication, mentoring, and support services to students and parents.

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INTRODUCTION

Education has a great influence on humans to enable them to survive by building good interactions with each other so that their life needs can be easily met. The world of education has experienced many changes during the Covid-19 pandemic, especially in learning that is carried out remotely or online. Distance learning is learning by using a medium that allows interaction between teachers and students. One way to reduce the spread of the SARS-CoV-2

virus is by implementing distance learning, but on the other side distance learning has a negative impact on learning. One of the negative impacts of distance learning is a decrease in understanding of the material presented and also a decrease in interest in learning due to various obstacles experienced by Adi (Adi et al., 2021), this also has an impact on learning mathematics.

Mathematics learning is one of the lessons that can prepare students to compete for global progress. With mathematical learning, students can develop ways of thinking that are abstract, deductive reasoning and related to structured ideas. By learning mathematics, students are expected to be able to apply mathematical thinking to solve both routine and non-routine problems. Steps that can be taken so that math learning can help students to think mathematically, explicitly (1) students are asked to explain mathematical objects, (2) teachers can provide examples of mathematical objects that have just been explained, (3) students are asked to solve problems similar to the examples given and (4) teachers provide practice problems. Practice problems given can be in the form of problems similar to examples to problems in the form of applications of mathematical objects in everyday life (Holisin, 2016).

Each learning has its own objectives as well as the objectives of learning mathematics regulated by Permendiknas No. 22 of 2006 (Permata & Sandri, 2020), so that students can have the skill: (1) understanding of mathematical concepts, explaining in a flexible, accurate and appropriate way how to solve problems between each concept and how to use algorithms or concepts, (2) reasoning on patterns and properties, collecting data and/or explaining mathematical questions and ideas, (3) problem-solving, which consists of understanding the problem, developing and solving mathematical models, and interpreting the solutions is obtained, as well as solving the problem, (4) the usage of symbols, charts, tables or other means to convey ideas to describe problems or circumstances, (5) an attitude that regards mathematics as an asset in every aspect of life.

Assessing the learning objectives for mathematics set out by Permendiknas No.22 of 2006 in terms of which students can solve problems, one can conclude that it's about their skill to be problem solvers. A human activity that combines previously acquired concepts and rules and not as a basic skill is the definition of problem-solving skill conveyed by Dahar (Harahap & Surya, 2017). It is interpreted that the student has an entirely new skill when they can solve a problem. This ability can also be used to address other issues of relevance. The more students solve problems, the more they learn to solve problems in theory and everyday life. Problem-solving skill can be interpreted as a person's ability to find ways or methods to solve problems through several activities including: observing, understanding, trying, guessing, finding, and reviewing (Hendriana et al., 2017). So, it can be concluded that problem-solving skill is the skill possessed by students to be able to observe, understand, try, assumption, find until students can review the answers that have been studied.

The level of students' mathematical problem skills can be measured if students have gone through several steps of problem-solving. The stages of problem-solving skill proposed by Polya (Setiawan & Harta, 2014) include: (1) understanding the problem, (2) designing the solution, (3) applying the solution, and (4) checking the process and results (looking back). The indicators of mathematical problem-solving according to Lestari & Yudhanegara (2015) are identifying the elements known, asked, and the adequacy of the elements needed; formulate mathematical problems or compile mathematical models; apply strategies for problem-solving; and explain or describe the results of problem-solving. It can be concluded that the indicators of problem-solving skill are understanding the problem, designing a solution or planning a solution strategy, implementing or applying the problem-solving strategy that has been made and checking the results that have been completed.

The results of interviews conducted by Fadhila (2020) with several teachers show that students' mathematical problem-solving skills during distance learning tend to decline, this can be seen from students' inability to solve problems related to problem-solving given by the teacher. In solving problems, using the correct principles and rules is hard for students, students also have difficulty in connecting some information into a complete solution. Research conducted by Ramadhan (Ramadhan et al., 2020) also shows that students' mathematical problem-solving skills are still quite low, this is evidenced by the average score obtained from 282 students is 46.15. To solve math problems, there are several different difficulties encountered by students. For example, some students find it difficult to gather information about the problem, which is based on stories, some students also have difficulty working on mathematical problem-solving questions because students do not understand the material provided. According to two research that have been conducted, it was found that students' mathematical problem-solving skills during the implementation of distance learning have changed.

It can be concluded that the effect of distance learning on students' problem-solving skills needs to be deepened, so it is hoped that there will be changes in learning activities that are tailored to the needs of students. However, in some studies it is not explained whether this distance learning can affect students' mathematical problem-solving skills. So that research is carried out by conducting literature to find out the effect of distance learning on students' mathematical problem-solving skills.

METHOD

The data collection technique used in this research is a literature review by using various reference sources relevant to the problem under study such as books, research journals and distance learning implementation modules applied to educational institutions. Reference sources were obtained from scientific papers indexed in https://scholar.google.co.id/. Articles published in 2012-2022, have ISSN and have h-index are the criteria for articles used as references in collecting data. Restrictions on the scope of study of the selected references include distance learning and mathematical problem-solving skills.

This research went through several processes described in the following diagram:

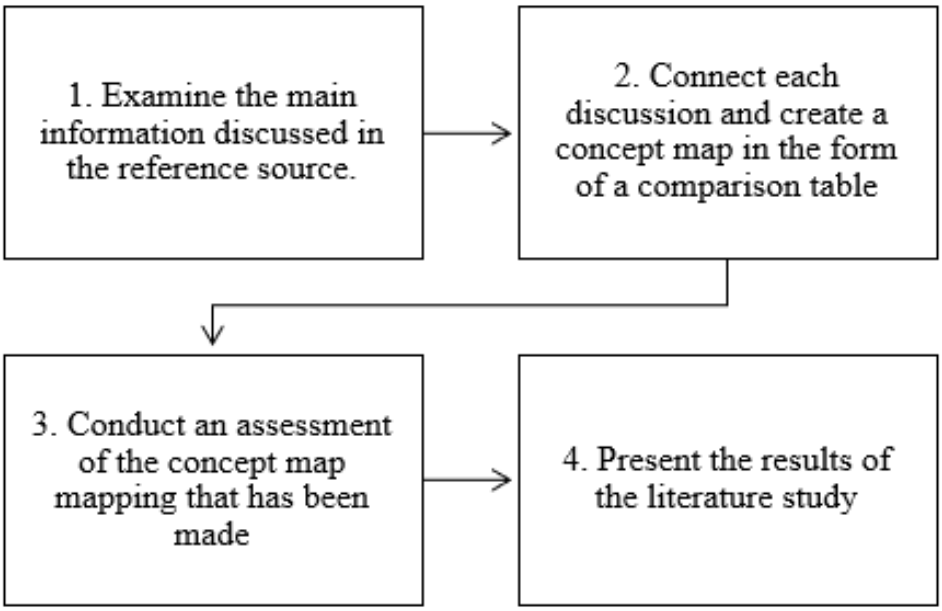

Figure 1. Diagram Research Flow of Literature Review

The results of this research are to describe and elaborate on the effect of distance learning on students' ability to solve mathematical problems. The way to describe and describe the data is

through several experts' opinions. This study is intended to give more detailed information about the effect that distance learning has on students' mathematical problem-solving skill, through a descriptive qualitative method.

RESULTS AND DISCUSSION

Results

In the literature search, several articles have been found for 2013 and 2023 that deal with important issues related to how distance learning affects math problem-solving abilities. Table 1 summaries the results of the literature:

Table 1. Findings of Literature Review

No	Source	Findings
1	Analisis Kemampuan Pemecahan Masalah Matematis Siswa Sebelum dan Sesudah Masa Pandemi Covid-19 di Kelas X MAN 1 Tapanuli Tengah (Apriadi et al., 2021)	The online learning process brings changes to students' mathematical problem-solving skills. The decline in students' mathematical problem-solving skill is caused by the absence of devices for most students and an unstable internet network. The existence of these obstacles makes students' interest in learning decrease, resulting in a decrease in students' mathematical problem-solving skill.
2	Pengaruh Pembelajaran Daring Pengguna *Platform* Digital Terhadap Pemecahan Masalah Matematis dan Sikap Kritis Siswa di MA Daar El Qolam (Yulianto, 2020)	Students' mathematical problem-solving skills during online learning can increase if the teacher uses a learning model that is tailored to the needs of students. Mathematical problem-solving skill depends on the learning process implemented so that the learning model used will have an influence on students' mathematical problem-solving skill.
3	Peningkatan Kemandirian Belajar dan Kemampuan Pemecahan Masalah Matematika Melalui Metode Resitasi Pada Siswa SMA (Nurhayati et al., 2022)	According to several indicators of the student's ability to solve mathematics problems, there has been a 25% increase in students' math problem-solving skills. This may be due to the fact that students are given the opportunity to explore the material, so that it has an impact on their ability to solve mathematical problems.
4	Analisis Kemampuan Pemecahan Masalah Matematika dalam Pembelajaran Jarak Jauh (PJJ) pada Materi Phytagoras Via Google Meet Kelas VII SMP IT Asy Syifa Qolbu (Siagian et al., 2021)	It has been found that the students' ability to solve problems, as well as their final assessment of those first results, can be attributed to indicators for student mathematics problem-solving skills. That's because students obsess over examples of problems presented by teachers.
5	Kemampuan Pemecahan Masalah Matematis dan Respon Siswa SMP dengan Pembelajaran Jarak Jauh Berbasis *Whatsapp Group* (Harisuddin & Sriyanti, 2022)	There is an increase in students' mathematical skills in several indicators, but students' mathematical skills are still said to be low because there are still many students who have difficulty in understanding the problem being asked.

6.	Profil Awal Kemampuan Pemecahan Masalah Masalah Siswa dalam Pelaksanaan Pembelajaran Jarak Jauh (Afidah et al., 2022)	The problem-solving skill of students is very diverse, this can be seen from the indicators of problem-solving skill obtained that the average student score in understanding the problem is in the high category, namely 72.56, the average student score in planning the problem is in the sufficient category, namely 59.45, the average student score in solving problems in accordance with problem-solving planning is in the high category, namely 70.13 and the average student score in re-examining the results of problem-solving is in the high category, namely 73.64.
7.	Analisis Kemampuan Pemecahan Masalah Matematis Siswa Kelas VII SMP Islam Malahayati pada Materi Aritmatika Sosial (Khoirunnisa et al., 2022)	1. The ability of students to solve mathematical problems is at a moderate level. 2. Students' ability to understand the problem indicator is at a percentage of 68.9%, this means that students can understand the problem well. 3. Students' ability in the indicator of planning problem-solving strategies is at a percentage of 81.3%, this means that students already know what to do to solve the given problem. 4. Students' ability in the indicator of applying problem-solving strategies is at a percentage of 74%, this means that students can apply what has been planned in solving problems. 5. Students' ability in the indicator of checking back is at a percentage of 23.8%, this implies that students are not used to checking out the process of submitting their answers.
8.	Going Remote During Covid-19 Pandemic: Effect of Problem-Based Learning towards Improving Students' Critical Thinking and Problem-Solving Skill (Choon, 2021)	After online learning, there is a better improvement in students' mathematical problem-solving skills. This can be seen from the results of the pre-test and post-test conducted. When the pre-test was carried out, the average score was 11.58 while when the post-test was carried out, the average score was 12.47 out of 34 students.

Discussions

According to several articles used as research sources, information is obtained that distance learning can influence students' mathematical problem-solving skills. The research results (Apriadi et al., 2021) show that there is a decrease in students' mathematical problem-solving skill. Based on indicators of students' problem-solving skill including: (1) understanding the problem, there was a decrease because most students did not write down the information contained in the problem or students only wrote down the information but did not really understand the problem given in the problem; (2) planning problem-solving, there was a decrease in students' ability to plan problem-solving because students were able to solve the problems given but the solutions made by students could not be said to be correct and accurate; (3) implementing problem-solving, there are still many students who do not complete the solution steps that have been made and students are unable to prove the correctness of the steps

they write; (4) checking back, this happens because students are not used to being given problems that use indicators of checking back.

One of the factors for the decline in students' mathematical problem-solving skills is caused by the decline in student interest in learning during online learning. Students' interest in learning can help students in solving problem-solving problems. This is evidenced in research conducted by Yuliati (2021) the correlation between students' interest in learning and students' ability to solve mathematical problems is positive, where the more students' interest in learning, the greater the effect on students' ability to solve problems.

The research carried out by Yulianto (2020) revealed that students' mathematical skills to solve problems have been enhanced when they are learning though the internet. Factors that can help improve students' problem-solving skills are the learning model used by the teacher and the communication established by teachers and students during online learning must run as learning is usually done. Cause, as a rule, cooperation between students and teachers would have improve the learning process (Nurhasanah & Luritawaty, 2021).

In another study conducted by Nurhayati (Nurhayati et al., 2022) also showed an increase in students' mathematical problem-solving ability in terms of several indicators of students' mathematical problem-solving skill. This increase in mathematical problem-solving skills is due to the active role of students in the process of understanding the material. Students' learning independence in the learning process makes students able to understand the problem, plan problem-solving strategies, implement the plans that have been made to check the results obtained.

This is in line with research conducted by Harisuddin & Sriyanti (2022) which states that there is an increase in students' mathematical problem-solving skill even though there is no significant difference, but students' mathematical problem-solving skill can be said to increase in terms of several indicators of students' problem-solving skill that can be achieved. For example, students' ability to solve problems presented in Venn diagrams, students are able to understand the problem to be solved, then students are able to plan problem solving strategies, then students are able to implement a problem-solving plan, and students are also able to reanalyze the results that have been achieved. This is due to the active role of students during distance learning.

The results of research conducted by Siagian (Siagian et al., 2021) show that students' mathematical problem skills in distance learning can be categorized in the medium category. The difficulties often experienced by students are in the problem-solving and problem-solving evaluation indicators. This may be since students do not understand the material taught, because they can be classified into categories of being able to understand and solve problems, based on the indicators of understanding the problem and problem solving. However, to solve problems students need to understand the material that is used as a problem. This ability will be obtained by students if students are familiar with problem-solving exercises and teachers also provide guidance and motivation so that students can solve mathematical problems.

It can be concluded that distance learning can provide an increase or decrease in students' mathematical problem-solving skill. An increase in students' mathematical problem-solving skills can be achieved if students are given the opportunity to explore and find material independently. A decrease in mathematical problem-solving skill can occur if students are not given the opportunity to explore their knowledge and also students only act as recipients of material. In addition, supporting factors such as the student learning environment during distance learning are also able to have a significant influence.

This is in line with the opinion of Wijoyo et al. (2021) regarding the effectiveness of distance learning activities, namely distance learning can have a positive or negative impact, all of which depends on the methods and implementation of learning prepared by the teacher. Provision of facilities and infrastructure, provision of materials and support from parents.

CONCLUSION

The results of research and discussions about the effects of distance learning on students' math problem-solving skill have led to the following conclusions: (1) In the case of distance learning, students' ability to solve mathematics problems is directly affected if they are given an opportunity to develop their knowledge independently. (2) The role of teachers in distance learning is very important to promote efficient education. (3) Students' involvement in distance learning can help solve mathematical problems, students that are given an opportunity to learn and present results of a conversation have higher math problem solving capacities than those who receive information only from the teacher. To assist students in improving their math problem-solving skills, additional research is intended to give them the best experience of distance learning.

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