



Media for Teaching Mathematics During the COVID-19 Pandemic: Systematic Review

Tria Mardiana^{1*}, Teguh Prasetyo²

¹Universitas Muhammadiyah Magelang, Indonesia

²Djuanda University, Indonesia

Corresponding author's email: triamardiana@ummgl.ac.id

ABSTRACT

This study aims to determine the learning methods in Mathematics subjects used during the covid-19 pandemic. This is important because of the need for information on various alternative learning media used during the COVID-19 pandemic. Various efforts have been made by the teacher so that mathematics learning can still run optimally. The method used in this study is a systematic literature review on research in 2020 – 2021. Research articles are limited to the topic of mathematics learning media during the covid-19 pandemic. From the research results obtained, online-based media dominate the results of research analysis. Use of online media such as podcasts, WhatsApp, YouTube, Google Classroom, Google Forms, Zoom, Google Meet, and Quizizz. The media is the most widely used. The next media that is widely used is the development of learning videos and interactive multimedia. From the analysis of the research results, it appears that offline learning while maintaining health protocols is not an alternative choice for learning activities

Keywords: *Media; Teaching Mathematics; COVID-19 Pandemic*

1. INTRODUCTION

Learning independence is one of the important things in a learning process [1]. During the Covid-19 pandemic, independent learning in learning activities became a common thing to do to maintain health protocols, as well as follow instructions from the government because face-to-face learning was still limited. Education is said to be successful if there is a positive change in students. With all the limitations of learning during the covid-19 pandemic, learning activities must still be carried out optimally. The success of a student in learning can be seen from his learning achievement. One of the indicators of learning achievement is obtained from student learning achievement in each subject.

Mathematics is one of the subjects that requires the transfer of understanding in the form of logical thinking. This process often occurs during regular face-to-face learning, obstacles still arise. During the COVID-19 pandemic, the challenges of delivering material in Mathematics were even higher. For this reason, it is necessary to have an alternative or a way to make delivery easier, one of these alternatives is the use of

media. Media that is in accordance with the character of students is needed in the teaching and learning process, one of which is so that learning becomes more effective [2]. Learning media can help teachers communicate material by making abstract material more real and complex material more understandable.

The use of learning media in the mathematics learning process can generate students' motivation and interest in learning independently [3]. Information about media that can be used as a learning tool for Mathematics is very important when the COVID-19 pandemic is still ongoing. This is because the school has not been held face-to-face so teachers really have to work extra in delivering Mathematics learning materials.

The purpose of this study is to examine the literature on the media used in learning mathematics during the covid-19 pandemic. Systematically collected and synthesized the analytical data and methods used in the literature, the quality and date of publication of the literature, and the main thing observed was the effectiveness of the media used during Mathematics learning. The importance of this research is to provide understanding for teachers to continue to innovate in

Mathematics learning activities, especially in the application of media during learning, so that even in conditions of limited access to face-to-face learning, the implementation of Mathematics learning remains maximal.

2. SAMPLE PREPARATION

The method part is structured around the question, "How was the problem solved?" If a paper offers a new approach, all relevant material must be supplied in detail so that the reader can replicate the experiment (example in Figure 1). The author, on the other hand, does not need to repeat the details of an established approach; instead, he or she should use references and supporting material to demonstrate the established procedure.

It is vital to notice that methods in the results section must be written in the same sequence. According to the

type of research, the sequence of writing approaches must also be reasonable. The methodology for one type of study will be substantially different from that of another. Writing survey research methods, for example, is significantly different from writing laboratory test research methods, which require a lot of equipment and supplies. Materials, tools, and data collection techniques are examples of separate subtitles for the method section.

Even though the issue is the same as in past research, a study's innovation is most likely in the method part. New approaches that are simpler but still capable of answering research problems are superior since they can be copied or utilized by future researchers. Furthermore, if the equipment has a tolerance for accuracy in reading data, such as a thermocouple, transducer, or air flow meter, it must be mentioned explicitly and honestly in the technique section.

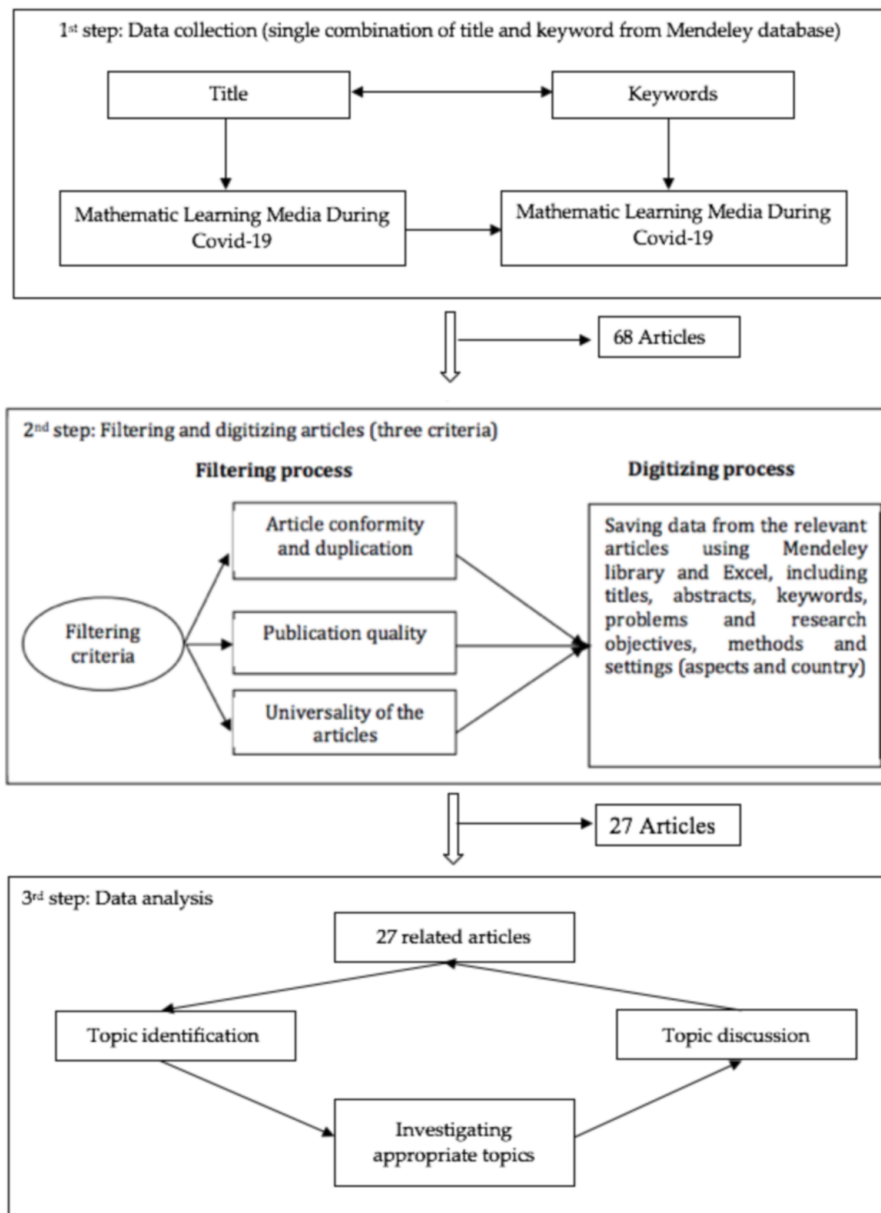


Figure 1 Steps in the literature review

Bibliographic studies are used to investigate, identify specific information on a topic, and categorize publications — in this example, mathematical learning media during the covid-19 epidemic. This study builds on prior research, specifically a literature evaluation undertaken by Faisal et al. and Wiryanto [4]. This study chose a more thorough theme of the media utilized in learning mathematics during the covid-19 pandemic since it is only focused on learning mathematics. This comprehensive review of the literature incorporates both qualitative (substantive) and quantitative analysis of 28 scholarly articles [5]. This literature study is organized into three stages: data collecting, article screening and digitization, and data analysis.

3. DATA COLLECTION

The first stage of this research was to observe previous research on mathematics learning during the covid-19 pandemic. Research observations were carried out over a period of 2 years, from 2020-2021 as the year the Covid-19 pandemic was very high.

4. FILTERING AND DIGITIZING ARTICLES

Three criteria are used in this study to verify that the search articles are of sufficient quality. The first two criteria are appropriateness and duplication. From the 68 articles submitted in the first phase, 27 were chosen after screening for suitability and duplication. The second criterion is the quality of the journal. This ensures that articles are obtained from published journals and processed online. Of the 27 articles, 10 of them are journals published online and on average have been indexed in Google Scholar. Then 17 other articles, apart from being indexed on Google Scholar, were also

Table 1 Number of Categories of Research Methods

Types of Research Methods	Number of Articles	Research Articles
Qualitative Method	17	[1], [3], [4], [6], [19]
Quantitative Method	2	[20], [21]
Mix Method	8	[2], [22],[28]

The theme relating to analysing learning methods during COVID-19 is quite large in the 2020-2021 period. The article that analyses the learning method is very important, especially as a reference in the implementation of the learning process during the

Table 2 SINTA Publication Quality

Types of research	Sinta Publication Quality						
	SINTA 1	SINTA 2	SINTA 3	SINTA 4	SINTA 5	SINTA 6	Non SINTA
Qualitative			2	5	1		9
Quantitative			1	1			
Mix method		1	4	2			9

indexed by SINTA, both for SINTA 1-6. All articles used for the analysis phase are articles published in 2020-2021 (2 years). Following data collection, the process of saving and digitizing the data, which includes titles, abstracts, keywords, research challenges and objectives, techniques and results of research analysis, is carried out using the Mendeley library and Microsoft Excel.

5. DATA ANALYSIS

This research is a continuation of previous research conducted by Faisal et al. and Wiryanto [4] which still focuses on the elementary school level. This study discusses a broader scope of research, namely for junior high and high school levels, as well as analysis of the literature over a longer period of 2 years. The three-stage analysis in this study uses analysis from Miles & Hubberman [5] as a guide to answer the questions in this systematic literature review. They served as a guideline for answering the questions in this systematic literature evaluation. The publications were identified in the first step based on the title, abstract, research questions, aims, and outcomes. Themes were evaluated in the second stage for the formulation of relevant topics and to describe themes that had not been discussed in prior investigations. The last stage wraps up each difficulty and organizes the articles into many groupings for deeper analysis of mathematics learning approaches during the covid-19 epidemic.

6. RESULT AND DISCUSSION

Of the 27 relevant articles, most of the studies used qualitative methods. Research that is in the qualitative category is 63%, research that is in the quantitative category is 7%, and a combination of qualitative and quantitative is 30%. The data can be seen more clearly in table 1.

COVID-19 pandemic. The research results obtained are very useful for teaching staff who really need alternative learning media during teaching. The data can be seen in Table 2.

The analysis of this study also describes the distribution of research methods that are widely used in research in various journal publications. Qualitative methods dominate, with choices in the form of case studies, descriptive, CAR, surveys, and literature studies.

From the research results obtained, online-based media dominates the results of research analysis. Use of online media such as podcasts, WhatsApp, YouTube, Google Classroom, Google Forms, Zoom, Google Meet, and Quizizz. The media is the most widely used. The next media that is widely used is the development of learning videos and interactive multimedia.

In some institutions, the process of learning mathematics is carried out online, while others still require parents to bring their children's assignments to school. There are both positive and bad effects felt by teachers, students, and parents during online learning in the middle of this pandemic [4]. Face to face is no longer done as an effort to suppress the spread of the corona virus [1].

An interesting learning process, maintaining health protocols, and maximum knowledge transfer are part of the efforts that teachers must make during learning activities during the covid-19 pandemic. The learning process carried out must be truly memorable for students so that it is easier for students to understand the material presented by the teacher [1]. Learning Mathematics is one of the subjects that has different characteristics compared to other subjects because there is a transfer of logical thinking given in understanding any given material. With limited access to learning during a pandemic, it is clear that a teacher must really be able to design maximum learning activities. The maximum that is meant is that the transfer of knowledge can actually be conveyed to students.

In the learning process in schools, media is a bridge to deliver learning materials [15]. During the COVID-19 pandemic, a lot of learning is done online. The choice of using online media in online learning needs to be adjusted to the condition of students' abilities in technology to facilitate access to learning that students can understand [3]. Sophisticated technology when it is not supported by sophisticated equipment and qualified human resources, its implementation will not be optimal. For this reason, it is necessary to have good cooperation between teachers as instructors, media devices used in teaching, technology that supports the application of media, and students who understand the concepts of learning given.

The research shows that in difficult and limited conditions, teachers, principals, and various parties involved in learning activities continue to work hard to create fun learning. The application of online applications and the creation of various new media are the choices of many teachers during the learning process. These alternatives are also analysed to show their impact. The result is that mathematics learning activities can still be carried out in the midst of many limitations during the COVID-19 pandemic.

7. CONCLUSION

The results of the analysis of this study indicate that, the concept of learning media used during the covid-19 pandemic, uses online media as an alternative to learning activities in mathematics subjects. Mathematics learning can still run well with various efforts, alternative media, and the support of various parties in learning activities. The students also remained enthusiastic about learning, even though they were in limited conditions and obeyed the health protocol

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