

Need Analysis Of Mathematics Digital Teaching Material

Meilani Safitri^{*1} & M.Ridwan Aziz²

Universitas Sebelas Maret, Jl. Ir. Sutami No.36, Kentingan, Kec. Jebres, Kota Surakarta, Jawa Tengah 57126, Indonesia
meilanisafitri@student.uns.ac.id

Abstract. Today's mathematics learning paradigm has been transformed into digital-based learning. This research is a qualitative descriptive study. The purpose of this study is to describe the results of the needs analysis of digital mathematics teaching materials. Data were collected through questionnaires and interviews with 11 mathematics teachers in Ngemplak, Boyolali, Central Java. Data analysis in this study was carried out by qualitative analysis and descriptive analysis. The results of this study indicate that: 1) 9 teachers out of 11 teachers interviewed agreed that digital mathematics teaching materials need to be further developed, 2) based on the results of the questionnaire that we distributed to students, teachers, parents, principals, and school supervisors in Boyolali found that 76.5% of respondents wanted digital mathematics teaching materials to be developed.

Keywords. Need analysis; mathematics; digital; teaching material

A. INTRODUCTION

The 21st century learning paradigm has influenced the learning system and process, not least in learning mathematics. Today's mathematics learning has been transformed into digital learning. The Covid-19 pandemic is also very influential in the development of digital learning, in this era digital learning is the main choice.

The digital era affects the pattern of community needs, including in the field of education. The development of the digital world affect the way students learn by optimizing the use of digital libraries in meeting the needs of their curiosity about teaching materials. Likewise in mathematics education, technology can be used in learning. Mathematics learning is undergoing significant changes due to digital and technology-based learning (Klingenberg et al., 2020).

Digital Learning is a modern learning system that uses technology, both software and hardware, which is used in an interesting and interactive teaching and learning process. Materials in Digital Learning in the form of text, modules, job sheets packaged in software, mobile learning, images, videos and animations are also adapted to the curriculum that can be accessed anywhere and anytime online.

Digital teaching materials are also environmentally friendly and support the paperless movement, as stated by Waller (2013), digital teaching materials have advantages including minimizing costs because they are not printed and storage is more practical. Doering, Pereira, & Kuechler (2012) added that digital teaching materials have the advantage that they are more practical to use and easy to carry anywhere. In digital teaching materials, information contains information in the form of text or images, interactive to students and can be adapted according to the needs of students.

One of the facilities that can be developed to improve the quality of the learning process is teaching materials. Teaching materials are a collection of learning materials that arranged in a

systematic manner, following established curriculum guidelines and enabling students to learn (Depdiknas, 2006). In its use, teaching materials need to ensure their quality in supporting the effectiveness of learning, because the use of teaching materials is linear with the learning process (Cahyadi, 2019, pp. 36).

Teaching materials are all forms of materials in the form of systematically arranged material devices that are used to assist teachers in carrying out learning activities and enable students to learn (Rahmadani et al., 2018). The preparation of teaching materials can be adapted to the needs of students and educators, so that teaching materials can be designed to encourage interest and provide learning opportunities independently in learning in accordance with one of the goals of national education (Omeri: 2015, p. 464). In addition, the use of teaching materials is always updated according to the readiness of the school and students. The use of teaching materials is also able to have an influence on student learning outcomes (Pranaja & Astuti, 2019, p. 253). This statement is reinforced by the increasingly rapid technological development conditions, so learning needs to be adapted to optimal use of technology.

Teaching materials are all forms of materials, both written and unwritten materials used to assist teachers in carrying out teaching and learning activities in the classroom (Prastowo, 2012). Broadly speaking, teaching materials consist of two types, namely printed teaching materials and non-printed teaching materials. Examples of printed teaching materials are textbooks, textbooks, handouts, modules, posters, and leaflets, while non-printed teaching materials can be in the form of audio teaching materials such as cassettes, radio, visual teaching materials such as pictures, photos, and audiovisual teaching materials such as videos/films. .

Teaching materials are one component that plays an important role in the learning process. According to Ardiansyah et al (2016) teaching materials are one component that can help the smooth learning of students and students. Teaching materials are materials that are prepared and brought by the teacher to deliver learning materials. The teaching materials meant by the researchers are teaching materials that make students interested in digital form. According to Fauzih & Danang (2015:5), that digital teaching materials are a set of technology-based or non-printed teaching media that are systematically arranged which are used for educational purposes learn to be independent.

The relevant research that has been carried out is the research of Libiawati et al (2020), the results of this study indicate that teaching materials are indeed needed as effectiveness in learning activities. This is the basis for the preparation of digital mathematics teaching materials so that they can be used in future learning activities.

As stated by (Zulkifli & Nadjamudin, 2002) that developing teaching materials is part of developing competence and can increase existence as a professional teacher. Therefore, a teacher is expected to be able to design and compile teaching materials that play a role in determining the success of the learning and learning process (Kusuman, Mukhidin, & Hasan, 2016). The development of teaching materials is one of the efforts that a teacher can do to reduce student learning difficulties (Sandiyanti & Rakhmawati M, 2018).

Mathematics teachers should try to facilitate students well so that teacher innovation is needed in developing teaching materials (Latifah & Widjajanti, 2017). Learning that only provides conventional teaching materials tends to be monotonous and makes students bored, less active, and less efficient. That is why (Apsari & Rizki, 2018) stated that research and development in Mathematics needs to be done as an innovation to make it easier for students to understand mathematics.

The form of teaching materials is adjusted to the needs and characteristics of each material to be delivered by the teacher. With the teaching materials, the learning process becomes effective and does not tend to lecture, but makes students more active because educators can take the time to guide their students to understand each learning topic through the teaching materials they use. Educators are required to have methodological abilities in terms of designing and implementing learning including mastery of the use of learning resources that can accelerate students' ability to understand mathematical concepts (Muga, et al: 2017). But in reality, the interest of teachers to innovate in making teaching materials is still very low.

Another fact is that students born in 2011-2025 are the alpha generation who tend to be familiar with technology and are considered a generation that is smarter than before (Fadlurrohim

et al., 2020, p. 180). This is a challenge for educators to be able to present more creative and innovative learning while still paying attention to the cognitive and psychological development of students. Learning also familiarizes students with 4C skills (Critical Thinking, Communication, Creativity and Collaboration) which are also related to mathematics (Sugiyarti et al., 2018, p. 440). Thus, teaching materials that can be developed on digital-based teaching materials.

B. METHODS

This research is a qualitative descriptive study. The purpose of this study is to analyze and describe the need for digital mathematics teaching materials. Data collection techniques through interviews and questionnaires. The data collection instruments were a list of questions and a questionnaire sheet. Data were analyzed descriptively qualitatively.

This research was conducted for three months. The study involved three schools in Ngemplak Boyolali. Interviews were conducted with mathematics teachers to determine the learning model, learning resources, and learning media used in the mathematics learning process. Meanwhile, questionnaires were distributed to students to find out the needs and characteristics of students.

Data processing begins with data collection. Then, data is presented to describe things that are in accordance with research needs. In the process of presenting data, data reduction is carried out so that researchers are able to draw conclusions from the data that has been processed. The interview aims to be able to find out the mindset of the resource person from the condition of the teaching materials. The purpose of the questionnaire was to find out information that was not obtained at the interview. This is also the supporting data from the interview.

In the interview stage, the researcher used a semi-structured interview type with the aim that the conversation could better represent the data. The researcher used descriptive qualitative method to analyze the data. Data obtained from interviews were processed by qualitative descriptive analysis by describing as a whole. Interview data is the main source in answering the problem formulation in research. Data analysis begins with the results of the interview which are listened to again from the recording, then written down entirely. After that, the researcher abstracted the interview results by focusing on matters related to the research and ignoring inappropriate information. Thus, the interview data will be confirmed by questionnaire data.

The stages of questionnaire data analysis in this study are as follows; (1) record all respondents' answers through questionnaires in Google Forms. This is done to find out the analysis of the needs for digital mathematics teaching materials (2) describe and narrate the data that has been obtained (3) make a final analysis in the form of a research report.

In the questionnaire distributed via google form, there are 6 questions given to mathematics teachers regarding the analysis of the need for digital mathematics teaching materials, namely (1) Based on your observations while teaching in class during the pandemic, how was the atmosphere during the learning process? (2) When teaching, have you ever used teaching materials? If so, what teaching materials have been used and the reasons for using them? If you do not use teaching materials, what is the reason? (3) What is your opinion about the use of teaching materials? Whether so far the material the teaching method used is able to support learning? (4) Of the many existing teaching materials, do you think that digital mathematics teaching materials can be used in learning? (5) What advice can you give regarding the development of digital mathematics teaching materials? (6) Are you willing to use digital mathematics teaching materials? After getting answers from respondents, the results of the answers to each question will be shown through tables, narrated and concluded.

C. RESULT & DISCUSSION

Needs analysis is defined as the needs of students in identifying problems that occur when learning mathematics takes place. From these problems, it can be used as a form of selecting suitable teaching materials to be developed, of course, to choose suitable teaching materials requires appropriate references and in accordance with the level of understanding of students.

The interview stage was conducted with 11 Mathematics teachers in two schools, namely SMA PD & SMA BS. Researchers asked six questions covering curriculum, core competencies, basic competencies, and learning objectives. Based on the results of the interviews, it was found that

teaching materials were very important in supporting the learning process, especially during this pandemic situation.

Based on the results of interviews with mathematics teachers that teachers prefer to teach using the lecture method and then write on the blackboard. The teacher also said that it was very rare to use the projector during the lesson for several reasons. Teaching materials used by teachers in the form of worksheets, textbooks, and materials from searches on the internet.

From the results of interviews that have been carried out, it is found that teachers in implementing learning activities during this pandemic use messaging applications as a communication tool as well as for the process of learning activities. The use of messaging applications for the process of learning activities is considered less effective because of the limitations in the features contained in the application.

One of the questions during teacher interviews was related to whether the use of teaching materials used during learning was effective to support learning during learning take place. Of the eleven mathematics teachers, eight teachers answered not yet effective. One of them is when reading the instructions contained in the teaching materials, there are several things that still have to be repeated because students do not understand what the instructions contained in the teaching materials mean. Ineffective learning can be caused because so far teachers are still using limited conventional learning media on the print module (Perawati et al., 2020).

The results of interviews with mathematics teachers stated that currently schools are using the 2013 curriculum. The learning resources currently used are government textbooks borrowed from schools and Student Worksheets (LKS). Based on interviews with teachers, it was known that during the covid-19 pandemic, the media used in learning activities was more dominant in the WhatsApp messaging application, this was done considering that if it was done synchronously many of the students were not ready to learn.

The mathematics teacher also stated that the activeness of students in learning activities was carried out in WhatsApp groups but only a few students were actively involved in discussions. From the results of interviews with mathematics teachers which were carried out referring to government books and Student Worksheets (LKS) which were then discussed in WhatsApp groups where student involvement was relatively low, resulting in many passive students.

Based on the results of student responses, regarding the analysis of student needs for digital mathematics teaching materials, namely: 76.5% responded that the teaching materials needed by students were digital mathematics teaching materials developed by educators, 12.7% responded that the teaching materials needed by students were teaching materials sent through the WA Group, and several other students chose teaching materials from youtube, self-searched teaching materials and printed teaching materials.

The results of the questionnaire analysis showed that as many as 63% of students did not like mathematics. But on the other hand, as many as 87% of students are interested in the existence of digital teaching materials used for learning mathematics. Based on this information and data, it shows that students want new teaching materials that are more interesting than teaching materials that have been used previously.

Furthermore, as many as 16 of 20 students (52%) can understand the material well and 15 of 20 students (48%) feel happy when learning. Based on the results of the questionnaire, it was found that 16 students (32%) used books as a learning resource, 16 students (31%) used other references as learning resources, and 19 students (37%) used the internet as a learning resource. This shows that the internet is becoming a widely used source of learning because now technology is increasingly advanced, no wonder learning resources can also be taken from the internet.

From the results of the questionnaire analysis of student needs for the development of digital mathematics teaching materials, 90% of students want other teaching materials other than textbooks or worksheets. As many as 60% of students need interactive teaching materials with mathematical concepts and those teaching materials are digital teaching materials.

Based on the analysis of the results of mathematics teacher interviews and the results of student questionnaires, it can be concluded that digital teaching materials are needed in learning mathematics and teachers are expected to be able to develop their own digital mathematics teaching materials. This is in accordance with the results of research (Mustapa & Rahmah, 2019) which states

that a needs analysis of the development of module-based TV engineering system teaching materials is needed by teachers and students.

Furthermore, the results of research (Ali & Adawiyah, 2018) state that teaching materials/textbooks are needed because they can improve students' problem-solving abilities and make learning more interactive. Learning using interactive media plays a very important role in increasing student interest in learning and increasing student learning motivation. Digital mathematics teaching materials are designed in an attractive manner so that students can interact with media that can increase motivation when studying offline or online. Through digital mathematics teaching materials, it is hoped that students will not only receive information but also be involved in thinking and be active in the learning process.

D. CONCLUSION

The results of this study indicate that: 1) 9 teachers out of 11 teachers interviewed agreed that digital mathematics teaching materials need to be further developed, 2) based on the results of the questionnaire that we distributed to students, teachers, parents, principals, and school supervisors in Boyolali found that 76.5% of respondents wanted digital mathematics teaching materials to be developed.

Based on the results of the needs analysis as a first step the development of digital mathematics teaching materials, it can be concluded that teachers and students really need other teaching materials other than textbooks/LKS provided from schools to learning process. The teaching materials needed by teachers and students in this needs analysis are digital mathematics teaching materials, so these teaching materials do need to be developed.

As a follow-up to this research, a suggestion is put forward, namely that a needs analysis should be carried out with a scale of wider area and can continue this research so that it can produce valid, practical, and effective products for used in the online and offline learning process.

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