
Pandemic Covid-19: The Opportunities and Challenges to Using ICT in Mathematics Learning

Sabaruddin¹, Marzuki², Khairunnisak³

Departement of Mathematics Education, Institut Agama Islam Negeri (IAIN) Langsa Aceh, Indonesia

Email : sabaruddin@iainlangsa.ac.id

ABSTRACT

Purpose: Social distance arrangements applied in all Indonesian educational institutions and even throughout the world including universities during covid-19 pandemic..

Design/methodology/approach: All teaching and learning activities on campus turn to online learning that uses a variety of teaching media, such as Zoom cloud meetings, WhatsApp groups, and Google classrooms.

Findings: The purpose of this study is to see how the opportunities and challenges of using information technology in learning mathematics during covid-19.

Research limitations/implications: The approach in this study uses a qualitative approach and type of descriptive research. Intake of research subjects using a purposive technique. .

Practical implications: The subjects in this study conduct 8 students of mathematics education department. The conclusions of this study are 1) The use of mathematics learning technology has been maximally carried out by students through online mathematics learning using various learning platforms. 2) In terms of understanding not all students can adapt to learn mathematics well because students have difficulty in understanding mathematics material through distance learning. 3) Factors that hinder learning are the availability of internet networks and the limitations of internet quotas..

Paper type: This paper is study case type

Keyword: Covid-19, technology utilization, online mathematics learning.

Received: October 13rd, 2020

Revised: November 8th, 2020

Published: November 30th, 2020

I. INTRODUCTION

The development of technology has many benefits in everyday life, especially in the field of education. The rapid development of information technology is driving changes in various fields, including education. The development of information technology can improve performance and enable various activities to be carried out quickly, precisely, and accurately (Laurens, Batlolona, Batlolona, & Leasa, 2017). Life has been influenced by various needs electronically or commonly called e-life such as e-government, e-commerce, e-education, e-medicine, e-laboratory, and other (Mailizar, Almanthari, Maulina, & Bruce, 2020). But unfortunately most teachers do not know and cannot run the online learning application (Zaharah & Kirilova, 2020). Although in daily life teachers often use technological tools and agree that if technology can help in learning, in reality teachers rarely apply it in the learning process, even almost 40% of teachers cannot integrate technology with learning (Hadijah & Shalawati, 2017).

The development of information technology also impacts on the demands of mathematical knowledge. Mathematics has an important role in the development of science and in everyday life, so to be able to master technology properly requires good mathematical abilities too. According to Cheah & Chirkov (2008) technology in learning mathematics should not be ignored by educators. In the Principles and Standards for School Mathematics, NCTM (2000) states that technology has a role as a facility in solving mathematical

problems, communication, reasoning, and evidence. In addition, technology can provide opportunities for students to explore mathematical ideas and support them in making connections both inside and outside mathematics (Hudson, Porter, & Nelson, 2008).

The use of information technology has a positive impact on increasing student understanding and can motivate students to be more enthusiastic in learning (Umar & Jalil, 2012). One of the use of technology that can be used as the main solution in inhibiting the spread of corona virus or covid-19 is by using online technology (Mailizar et al., 2020). Based on data obtained from UNESCO, currently a total of 39 countries have implemented school closures. China has by far the largest number of students affected by the corona virus, which is around more than 233 million students (Kraemer et al., 2020) Whereas other countries, until March 13, there were 61 countries in Asia, Africa, the Middle East, Europe, North America and South America that had imposed restrictions on learning activities in schools and universities by conducting online learning (Sintema, 2020).

Covid-19 pandemic has affected all levels in the education system in Indonesia, starting from the elementary level up to universities, all having a negative impact because students, students and students are "forced" to learn from home because face-to-face learning is eliminated to prevent covid-19 transmission. Though not all students, students and students are accustomed to learning through online even many teachers and lecturers who are not yet proficient in teaching using internet technology or social media, especially in various regions (Zaharah & Kirilova, 2020).

IAIN Langsa is a college in Langsa that has taken preventive measures to protect all students, lecturers, and staff from transmission or corona virus infection by conducting lectures by utilizing online technology. Online technology is a technological development that greatly helps us in communicating especially for two-way communication over long distances (Hudson et al., 2008). This online technology is a communication that is exchanged and connected, can be used simultaneously involving many people or only with 2 people. But this online technology also requires supporting devices such as computers, smartphones or other aids that are used as intermediaries, especially they must be connected to the internet.

With online technology, it can support work such as teaching and learning programs through an e-learning tool or online learning where students and lecturers conduct distance learning and can communicate easily to interact with different distances and places (Umar & Jalil, 2012). Distance learning is an institution-based formal education, where separate learning groups and communication systems are used in interactions (Holden, Philip, & Westfall, 2008). Distance learning in its implementation can make students have the skills and greater opportunities for interaction.

The current technology can be used by lecturers as a learning medium or as an intermediary in conveying knowledge to students through several applications such as face-to-face applications such as zoom, google meet and other online media platforms such as google classroom, whatsapp group, etc. So by using these learning media lecturers can make interesting and not monotonous material explanations so that students are interested and remain enthusiastic in participating in the teaching and learning activities .

Not all the ways of learning by utilizing technology as online learning media have a positive impact. With the use of technology, there are several factors that hinder the implementation of online learning processes, namely the low mastery of technology, limited facilities and infrastructure, the internet network, and the costs incurred for online learning are separate problems for lecturers and students (Dahlan, Sari, & Mansor, 2019). Based on the background of the problems outlined above, the formulation of the problem in this research is how is the use of information technology in learning mathematics during covid-19 for students of IAIN Langsa Mathematics Education Study Program?

The purpose of this research is to find out the opportunities and challenges to use of information technology in learning mathematics during co-19 for students of IAIN Langsa Mathematics Education Study Program. The benefit of this research is to find out the use of technology in learning mathematics during covid-19, as input for students of the Mathematics Education Study Program IAIN Langsa in mathematics learning in order to apply technology that can support student motivation in learning, and as a reference for readers so they can develop other research with a different and broader topic.

II. METHODOLOGY

A. Research Design

The approach in this study uses a descriptive qualitative approach. A qualitative research approach is to uncover and understand something behind the phenomena to be studied (Roller & Lavrakas, 2015). In addition, a qualitative approach is used so that researchers gain insight into something new that is known by directly observing the object of research. While the type of descriptive research is a research method that seeks to describe and interpret objects as they are (Maxwell., 2012).

B. Participants

Intake of research subjects using a purposive technique. According to Bungin (2007) a purposive technique is a technique of taking informants in qualitative research by determining the group of participants according to selected criteria that are relevant to the research problem. The determination of subject selection will influence the success and smoothness of information gathering which will ultimately determine the efficiency and effectiveness of the research. Based on the description above, the subjects in this study were 8 students of IAIN Langsa Mathematics Education Study Program.

C. Instrumentation

Data collection tools in this study are researchers themselves who are assisted with questionnaire sheets, and interview sheets (interviews). This questionnaire sheet is used to find out information about the use of mathematics learning technology during co-19 for students of IAIN Langsa Mathematics Education Program. Interview sheets in this study were used to add information related to the results of student questionnaire answers about the use of mathematics learning technology during co-19 for students of IAIN Langsa Mathematics Education Program.

D. Data Collection and Analysis Interviews

Data collection was carried out by conducting telephone interviews in accordance with the covid-19 protocol, interviews were recorded for transcription. Data analysis techniques used in qualitative research according to Creswell (2010) through the following steps, namely: 1) Process and prepare data for analysis. 2) Read the entire data. 3) Analyze in more detail by coding the data. Coding is the process of processing material / information into writing segments before interpreting them. 4) apply the coding process to describe the settings, people, categories to be analyzed. 5) show how the description of the information obtained will be restated in a qualitative narrative report. 6) Interpreting or interpreting data.

III. RESULTS AND DISCUSSION

Utilization of covid-19 mathematics learning technology for students of IAIN Langsa Mathematics Education Study Program based on questionnaire answers and interview results are presented in the description below. The author describes the results of interviews and questionnaires of Following are the results of interviews conducted by researchers against students of the IAIN Langsa Mathematics Education Study Program.

The first question that the researchers asked was as follows:

"... Do you find it difficult to use technology as online learning media?" then the answers from students are as follows:

S1: "... Not because I am used to using technology ..."

S2: "... No, I am very happy to use it ..."

S3: "... Yes, because I am not used to it, I often feel nervous when learn to use the application ... "

S4: "... It's normal if I learn to use technology ..."

S5: "... No, I really like it ..."

S5: "... no ..."

S6: "... Yes, because I'm not very good at using it and I ..."

S7: "... I used to enjoy learning by using it technology..."

S8: "... Yes sometimes ..."

The second question the researchers asked was as follows:

"... How do you feel about using online technology during covid-19?" then the answers from students are as follows:

S1: "... Very helpful ..."

S2: "... Strongly agree because we can avoid the 19th covid plague ..."

S3: "... A very correct policy ..."

S4: "... The choice of the right solution, especially during the covid-19 like now ... "

S5: "... Very helpful ..."

S5: "... The right decision ..."

S6: "... Very helpful because the best solution of the time now is to utilize technology for the process distance learning ... "

S7: "... Great ..."

S8: "... the right solution in the 19th co-pandemic as it is now this..."

The third question that researchers ask is as follows:

"... What technology is used during the online learning process and does using the application make it easier for you to learn?" then the answers from students are as follows:

S1: "... Depending sometimes the Zoom cloud meetings application, WhatsApp group, and Google classroom and really helped me save the document the important one..."

S2: "... It depends on the lecturer wanting to use the application and yes very much fun because it can save important documents that are given by the lecturer ... "

S3: "... Zoom cloud meeting and WhatsApp group ..."

S4: "... It depends on the lecturer and is very helpful in saving important documents"

S5: "... Zoom cloud meetings, WhatsApp group, and Google classroom ... "

S6: "... Depends on the lecturer ..."

S7: "... WhatsApp group and Zoom cloud meetings ..."

S8: "... It depends on the lecturer but the lecturer often uses the Zoom application cloud meetings and also very easy because it can save important documents ... "

The fourth question that researchers ask is as follows:

"... Have you been able to adapt the changes from face-to-face learning to online learning and do you understand the material taught by lecturers?" then the answers from students are as follows:

S1: "... No and I also feel the difficulty in understanding the material lecturers taught so that many assignments were given by lecturers not I understand..."

S2: "... Yes, I am getting used to it and I haven't experienced it either difficulty in understanding material through online learning ... "

S3: "... Yes, sometimes I get nervous because I'm not used to doing processes learning without face to face especially if the material is learned is mathematics ... "

S4: "... No and I feel difficulties even though there are lecturers send a learning video and I repeat watching it I still don't understand because math is difficult ... "

S5: "... I don't like the change in learning now..."

S5: "... no ..."

S6: "... Yes, because I'm not very good at using it and me don't like changes in the current learning system but I was forced to follow him ... "

S7: "... Yes for a long time I got used to it and I didn't feel it either difficulty in understanding the material because the lecturer has sending learning videos related to the material and I can repeat the video if there is material I don't understand ... "

S8: "... No and I find it difficult even though there are lecturers send a learning video and I repeat watching it I still don't understand because math is difficult ... "

The fifth question that researchers ask is as follows:

"... Have the facilities in online learning been fulfilled?" then the answers from students are as follows:

S1: "... Not yet ..."

S2: "... I have not felt constrained at the cost of buying a quota Internet..."

S3: "... No and I live in an area that is very difficult to get network ... "

S4: "... It depends on the lecturer and is very helpful in saving important documents"

S5: "... Not entirely because even though I have the means and infrastructure to start online learning such as smartphones or laptop but I still have trouble buying quota continuous internet ... "

S6: "... No ..."

S7: "... Not at all ..."

S8: "... Not yet and I am very constrained by the network because I am in the village I was very difficult to get a signal so I was find it difficult if you have to study online ... "

Based on the results of the interview it can be concluded that the students as the subjects of this study gave answers and positive responses to the use of information technology in mathematics learning during covid-19 but there were only a few obstacles experienced by students during the online learning process that students felt a little difficulty in understanding the material presented Online lecturers besides that students also find it difficult to get a signal if they live in remote areas and the high costs that must be spent by students to buy an internet quota.

A. ICT in Learning During Covid-19

Distance learning is carried out during the pandemic covid-19. Required a variety of appropriate technological media and internet connected to be able running distance learning (Mailizar et al., 2020). Learning management by using ICT is more needed by the role of the teacher and the ability of the teacher to process technology (Hudson et al., 2008). It was found that there were many obstacles in the field, the teacher did not understand the technology-based learning media, the delivery of lessons with the media technology was less effective, parental support was also lacking (Dahlan et al., 2019).

Online learning is able to simplify communication between lecturers or students and is able to provide convenience in distributing and assessing assignments. In addition, students can collect their assignments within a certain period of time which will then be examined directly by the lecturer (Al-Marroof & Al-Emran, 2018) States that learning through networks has the potential for meaningful learning, ease of access, and improvement in learning outcomes. In the context of online learning, students can relate quickly and directly with text, images, sound, data and two-way video with teacher guidance. The face-to-face tutorial was replaced with a technology intermediary in the hope that student learning outcomes would be good amid the rise of the covid-19 virus (Dennis, Sorrells, & Falcomata, 2016). Has conducted a study of 59 research results concerning computer-aided learning and learning outcomes. Research studies that focus on technology are apparently better than studies that discuss the impact of technology on the learning environment. So that later will result in increased student achievement, because not only mastery of the material but also overcome the technology (Hadijah & Shalawati, 2017).

B. Barriers to Mathematics Learning During Covid-19

Some of the impacts felt on the learning process at home are students forced to study distance without adequate facilities and infrastructure at home. This facility is very important for the smooth learning process. In addition, students do not yet have a culture of distance learning because all this time the learning system is implemented is through face-to-face, students are accustomed to being in school to interact with their friends, joking and face-to-face with their lecturers, with the existence of distance learning methods to make the students students need time to adapt and they face new changes that will indirectly affect their absorption (Muilenburg & Berge, 2005).

Difficult to get internet network in remote areas makes it difficult for students to follow the online learning process and many students have to struggle to get a signal to be able to follow the lecture process and it also makes student safety threatened, because many students are willing to do anything in order to get a signal like climbing to a higher place. In addition, the costs incurred for buying internet quota are also a big problem in the online learning process. Because not all students are able to buy internet quota repeatedly in the near future. And if viewed in terms of understanding, not all students can master the material, even many students find it difficult to do the tasks given by the lecturer.

IV. CONCLUSION

Most students are able to carry out online mathematics learning well by using various learning platforms. The enthusiasm and enthusiasm of students to try to master the learning content, work on assignments and online exams is quite high. In terms of understanding, not all students can adapt to access mathematics learning content well besides that many students complain of difficulties in understanding mathematics material because not all students are able to study the material taught by lecturers online. Some students are also constrained by external factors, namely the availability of internet networks that are inadequate for learning, E-learning platforms that often have errors, as well as the learning environment that is less conducive to carrying out the learning process.

REFERENCE

- Al-Marroof, R. A. S., & Al-Emran, M. (2018). Students Acceptance of Google Classroom: An Exploratory Study using PLS-SEM Approach. *International Journal of Emerging Technologies in Learning (IJET)*, 13(06), 112–123. <https://doi.org/10.3991/ijet.v13i06.8275>
- Bungin, B. (2007). *Penelitian Kualitatif: Komunikasi, Ekonomi, Kebijakan Publik dan Ilmu Sosial lainnya*. Jakarta: Putra Grafika.
- Cheah, C. S. L., & Chirkov, V. (2008). Parents' Personal and Cultural Beliefs Regarding Young Children. *Journal of Cross-Cultural Psychology*, 39(4), 402–423. <https://doi.org/10.1177/0022022108318130>
- Creswell, J. W. (2010). *Research design: pendekatan kualitatif, kuantitatif, dan mixed*. Yogyakarta: PT

Pustaka Pelajar.

- Dahlan, S., Sari, R., & Mansor, R. (2019). Kompetensi Pedagogik: Sebuah Tinjauan tentang Internalisasi Nilai-Nilai Karakter pada Pembelajaran Matematika SD. *Suska Journal of Mathematics Education*, 5(1), 1–9. <https://doi.org/10.24014/sjme.v5i1.6318>
- Dennis, M. S., Sorrells, A. M., & Falcomata, T. S. (2016). Effects of Two Interventions on Solving Basic Fact Problems by Second Graders With Mathematics Learning Disabilities. *Learning Disability Quarterly*, 39(2), 95–112. <https://doi.org/10.1177/0731948715595943>
- Hadijah, S., & Shalawati, S. (2017). Investigating Teachers' Barriers To Ict (Information Communication Technology) Integration In Teaching English At Senior High Schools In Pekanbaru. *Proceeding of the Fifth International Seminar on English Language Teaching (ISELT-5)*, 5(1), 302–310.
- Holden, J. T., Philip, E. D., & Westfall, J.-L. (2008). *An Instructional Media Selection Guide For Distance Learning Chairmen Emeriti United States Distance Learning Association*.
- Hudson, R., Porter, A., & Nelson, M. (2008). Barriers to Using ICT in Mathematics Teaching: Issues in Methodology. *EdMedia + Innovate Learning*, 2008(1), 5765–5770.
- Kraemer, M. U. G., Yang, C.-H., Gutierrez, B., Wu, C.-H., Klein, B., Pigott, D. M., ... Scarpino, S. V. (2020). The effect of human mobility and control measures on the COVID-19 epidemic in China. *Science*, 368(6490), 493–497. <https://doi.org/10.1126/science.abb4218>
- Laurens, T., Batlolona, F. A., Batlolona, J. R., & Leasa, M. (2017). How Does Realistic Mathematics Education (RME) Improve Students' Mathematics Cognitive Achievement? *EURASIA Journal of Mathematics, Science and Technology Education*, 14(2), 569–578. <https://doi.org/10.12973/ejmste/76959>
- Mailizar, M., Almanthari, A., Maulina, S., & Bruce, S. (2020). Secondary School Mathematics Teachers' Views on E-learning Implementation Barriers during the COVID-19 Pandemic: The Case of Indonesia. *Eurasia Journal of Mathematics, Science and Technology Education*, 16(7), em1860. <https://doi.org/10.29333/ejmste/8240>
- Maxwell, J. A. (2012). *Design, Qualitative Research Approach, An Interactive*. George Mason University: SAGE Publications, Inc.
- Muilenburg, L. Y., & Berge, Z. L. (2005). Student barriers to online learning: A factor analytic study. *Distance Education*, 26(1), 29–48. <https://doi.org/10.1080/01587910500081269>
- Roller, M. R., & Lavrakas, P. J. (2015). *Applied qualitative research design: A total quality framework approach*. New York: Guilford Press.
- Sintema, E. J. (2020). Effect of COVID-19 on the Performance of Grade 12 Students: Implications for STEM Education. *Eurasia Journal of Mathematics, Science and Technology Education*, 16(7). <https://doi.org/10.29333/ejmste/7893>
- Umar, I. N., & Jalil, N. A. (2012). ICT Skills, Practices and Barriers of Its Use Among Secondary School Students. *Procedia - Social and Behavioral Sciences*, 46, 5672–5676. <https://doi.org/10.1016/j.sbspro.2012.06.494>
- Zaharah, Z., & Kirilova, G. I. (2020). Impact of Corona Virus Outbreak Towards Teaching and Learning Activities in Indonesia. *SALAM: Jurnal Sosial Dan Budaya Syar-I*, 7(3). <https://doi.org/10.15408/sjsbs.v7i3.15104>