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The Use of ICT and Its Challenges during the COVID-19 Outbreak: A Phenomenological Study of Junior High School Mathematics Teachers in Indonesia

Mochammad Taufan, Luthfiyati Nurafifah, Sudirman, Topik Ilham

Department of Mathematics Education, Universitas Wiralodra, Indonesia

Abstract: This study aimed to describe the ICT products used and the difficulties experienced by junior high school mathematics teachers in Indramayu during online learning during the pandemic COVID-19. In this study, researchers used a phenomenological method based on observation, interview and documentation techniques. Data analysis in this study consisted of data reduction, data presentation and conclusion drawing using the application ATLAS.ti 8. ICT products used by junior high school mathematics teachers in Indramayu include; Zoom Meeting, YouTube, WhatsApp, PowerPoint, Google Meet, Google Form, Google Drive, Google Classroom, Geogebra and School Blogger. The results showed that the most widely used ICT product by data sources was the WhatsApp application. The difficulties of mathematics teachers during online learning are also very diverse, but the most common are network problems and internet quotas.

Keywords: information and communication technology, online mathematics learning, learning difficulties, COVID-19.

Abstrak: *Penelitian ini bertujuan untuk mendeskripsikan produk ICT yang digunakan dan kesulitan yang dialami oleh guru matematika sekolah menengah pertama (SMP) di Indramayu pada saat pembelajaran daring selama pandemi COVID-19. Pada penelitian ini, peneliti menggunakan metode fenomenologi berdasarkan teknik observasi, wawancara dan dokumentasi. Analisis data pada penelitian ini terdiri dari reduksi data, penyajian data dan penarikan kesimpulan dengan menggunakan aplikasi ATLAS.ti 8. Produk ICT yang digunakan oleh guru matematika SMP di Indramayu antara lain; Zoom Meeting, YouTube, WhatsApp, PowerPoint, Google Meet, Google Form, Google Drive, Google Classroom, Geogebra dan Blog sekolah. Hasil penelitian menunjukkan bahwa produk ICT yang paling banyak digunakan oleh sumber data adalah aplikasi WhatsApp. Kesulitan guru matematika pada saat pembelajaran daring juga sangat beragam, namun yang paling banyak dialami adalah masalah jaringan dan kuota internet.*

Kata Kunci: *teknologi informasi, pembelajaran matematika secara daring, kesulitan belajar, COVID-19.*

▪ INTRODUCTION

Technology is like an air that is so familiar, even almost all corners of the world can access technology. The use of technology can be used for various things, from positive things to negative things, it's just a matter of how we use the technologies. For example, in the field of education according to Yates et al., (2020) digital technology has been introduced into the world of education and it has changed the context of teaching and learning, with increasing access to devices, the internet and collaboration tools, which resulting the integration or infusion of digital technology in the education system. Especially in the COVID-19 pandemic which has made some problems for many sectors.

Mochammad Taufan et al.
Email: mochammad.taufan@unwir.ac.id

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The COVID-19 pandemic was first identified in Wuhan, China. The CoronaVirus Disease-2019 or COVID-19 pandemic has resulted the lockdown or regional quarantine policy. The Indonesian government finally has decided to conduct online learning or distance learning to anticipate the spread of COVID-19 (Aminullah, 2021). According to Sadikin & Hamidah (2020), online learning is defined as learning that involves using the internetto bring up various types of interaction in the process of implementing the learning. As the opinion of Rasilah et al. (2021), teachers do not only use hardware and software technology in the classroom, but also have to be more creative and varied in their learning process by using technology appropriately, especially in mathematics, because mathematics is considered a lesson. which is difficult because of the characteristics of mathematics which are abstract, logical, systematic, and full of confusing symbols and formulas Khirwadkar et al., (2020).

Learning mathematics online has made it difficult for some teachers and students. Learning difficulties according to Pramesti et al., (2021) are a condition of a person who is unable to carry out learning optimally which is caused by two factors, namely from oneself (internal factors) and from outside oneself (external factors). The teacher experienced several difficulties in learning mathematics online, including the difficulty in conveying the introductory, core and closing activities. As well as the final difficulty in providing assessments during online learning, namely affective, cognitive and psychomotor, teachers have difficulty applying three assessments at once in online learning Nailufar & Zain, 2021).

There are several ways that mathematics teachers can do to overcome this, one of which is through the use of internet-based technology by using various applications in the application of learning media so that learning becomes more interesting (Nurhayati, 2020). In addition to interesting learning, the material presented must also be easier to understand, one of which is by utilizing the use of various ICT products, as media in helping the online mathematics learning process must adapt to the conditions of students.

The use of ICT in mathematics for the application of two-dimensional and three-dimensional drawings will make it easier for students, thereby possibly making ICT dependent on application practice (Das, 2019). ICT products that can be used to assist online learning include; WhatsApp, Google Classroom, YouTube, Zoom Meeting, and other e-learning applications (Taufan & Nurafifah, 2021), Augmented reality (Sudirman, et al, 2020, 2021). The WhatsApp application is an internet-based application that is very popular and in demand because it functions as a communication tool that is quite easy for its users Rahartri (2019), this application can be used in online learning as a medium of communication between teachers,students and parents of students.

Google Classroom is a platform made by Google as a classroom application in cyberspace that can be used as a virtual learning medium or a place for distributing assignments, and even assessing submitted assignments Salamah (2020), this application can be used by teachers as a place to facilitate students in submit assignments during online learning. YouTube is a site for finding various information, news, sharing experiences, viewing tutorials on solving questions, viewing materials even as entertainment for watching movies and listening to music Samosir et al. (2018) when the material provided by the teacher to students is lacking. can be understood or understood optimally by students, students can use the YouTube application to learn material that is less understood. Zoom Meeting is a communication application that uses various devices,

both mobile and desktop and in this application is also used to meet face-to-face with a large number of participants Gunawan et al., (2021) of course in education there needs to be a meeting to discuss material that will or has been conveyed or just want to know information about the condition of students and teachers, but due to restrictions for in-person meetings, the Zoom Meeting application can be an alternative at this time.

There are still many other ICT products that can be used as tools in the online mathematics learning process as a result of the COVID-19 pandemic, therefore researchers are interested in conducting research on what ICT products are used and what difficulties are experienced by teachers. junior high school (SMP) mathematics in the city center and suburbs of Indramayu during online learning during the COVID-19 pandemic.

▪ METHOD

Participants and Research Site

Taking participants as a source of research data in this study using purposive sampling. Senjaya (2020) said that purposive sampling is a technique or method of taking samples based on considerations of relevance to the objectives and objects to be studied without considering the similarity of opportunities for each other member of the population to be taken as samples or data sources. The data sources in this study consisted of 8 junior high school mathematics teachers located in the city center and suburbs of Indramayu. The research data sources were involved as primary data sources regarding the use of applications during online learning. Data collection techniques used are observation, interview and documentation techniques. This research was conducted during 22-30 November 2021 in two Indramayu areas, namely Indramayu City which includes 2 sub-districts consisting of 4 schools and in West Indramayu which includes 4 sub-districts consisting of 4 schools. The data analysis technique in this study consisted of data reduction, data presentation and conclusion.

Research design

This study, researchers used qualitative research methods with a phenomenological approach. Broadly speaking, the notion of qualitative research with a phenomenological approach is a research method to explore information about the experiences of research subjects related to phenomena experienced consciously and in accordance with reality (Helaluddin, 2018). The phenomenon in this study, namely the use of ICT by junior high school mathematics teachers in online learning during the COVID-19 pandemic.

Instrument

The instrument in this study used a semi-structured interview technique. A semi-structured interview is an interview, which in its implementation is more free and relaxed compared to a structured interview (Sugiyono, 2015). The right questions during the interview were in accordance with the research questions, then the questions were developed according to the answers from the data sources. Interviews were conducted at the homes of each data source and interview transcripts were made.

Data Analysis

The procedure in analyzing the data in this study refers to the steps of data analysis of the Miles and Huberman model (Sugiyono, 2018), namely reducing data, presenting

data, and verifying the results of the reduction.

Reducing data means summarizing, choosing the main things, focusing on the important things, looking for themes and patterns, and discarding unnecessary ones (Sukestiyarno, 2020). After the data is grouped, the next step in reducing this data is coding. This coding, judging from the results of observations, interviews, and documentation that has been grouped using the ATLAS.ti 8 application. This coding is also carried out as is to obtain valid data. However, this coding cannot be separated from answering the formulation problem, the ICT products used and the difficulties experienced by junior high school mathematics teachers during the COVID-19 pandemic. After the data is reduced, the next step is to present or display the data (Sugiyono, 2018). The data are then presented using ATLAS.ti 8. Conclusions are verified by testing the truth, strength, and suitability of the meanings that emerge from the data to test the validity of these meanings. At this stage, verification is carried out based on the results of data presentation that is adjusted to the problem formulations in this study. The conclusions in this study are what ICT products are used and what difficulties are experienced by junior high school mathematics teachers during online learning during the COVID-19 pandemic.

▪ RESULT AND DISSCUSSION

The research data collection was carried out on November 22-30 2021 through interviews with junior high school mathematics teachers in Indramayu. The research subject or data sources in this study, namely junior high school mathematics teachers in Indramayu with the criteria of a school located in the city center covering two sub-districts, namely Sindang sub-district and Indramayu sub-district, consisting of SMP Negeri 1 Sindang (S1), SMP Negeri Uggulan Sindang (S2), SMP Negeri 1 Indramayu (S3) and SMP Negeri 2 Indramayu (S4). Then the schools located in the western part of Indramayu are 4 sub-districts, including Kroya sub-district, Gabuswetan sub-district, Kandanghaur sub-district and Losarang sub-district, which consist of SMP Negeri 1 Kroya (S5), SMP Negeri 1 Gabuswetan (S6), SMP Negeri 1 Kandanghaur (S7) and SMP Negeri 1 Losarang (S8).

After the data is collected, then the data is analyzed by reducing the data, presenting the reduced data and drawing conclusions. The process of analyzing data from research results using the ATLAS.ti 8 application. According to Afriansyah (2018), the ATLAS.ti 8 application is useful in helping the process of analyzing qualitative research type data, in processing research data using this application each data is coded, making it easier for researchers to reuse the data as a material for discussion in their research. The result of coding using ATLAS.ti 8.

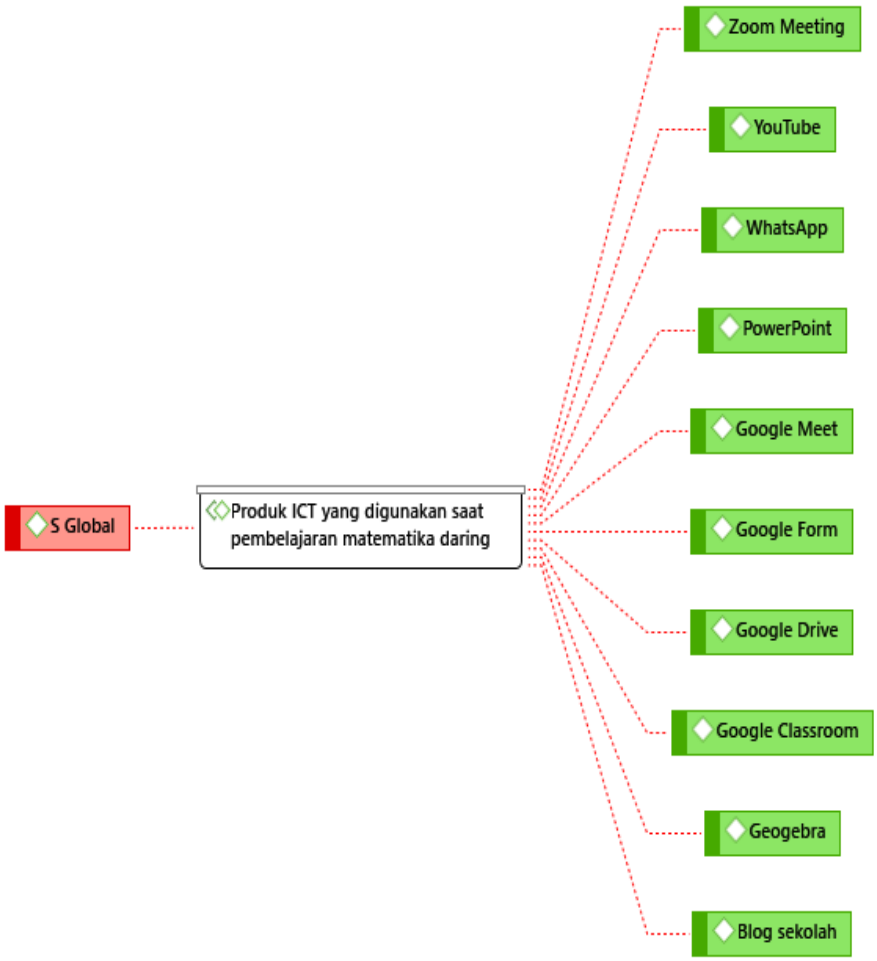

Figure 1. Data Coding Results About Applications Used Data Sources Data Using ATLAS.ti 8 Applications.

Based on Fig. 1 shows that the ICT products used by junior high school mathematics teachers in Indramayu during online learning during the COVID-19 pandemic are very diverse and varied, including the Zoom Meeting application, YouTube, WhatsApp, PowerPoint, Google Meet, Google Form, Google Drive. , Google Classroom, Geogebra and School blogger. Many studies show that ICT has proven useful as a tool in supporting and transforming the teaching and learning process. in the mathematics classroom, ICT can help students and teachers to perform calculations, analyze data, explore mathematical concepts thereby increasing understanding in mathematics (Saha et al., 2010).

These results are in accordance with the research of Sulistiawati et al., (2021), such as; 1) the use and development of ICT products in mathematics learning interactive technology in the last decade to the use of high technology, including teachers have used video, general ICT software, and mathematics ICT software, and 2) users (teachers and students) of ICT in learning (especially mathematics software) have a positive response to the use of ICT in learning. Google Classroom, WhatsApp and YouTube applications

can be used as online learning media which are quite effective today, because teachers and students are already familiar with these applications. (Puspitarini & Hanif, 2019).

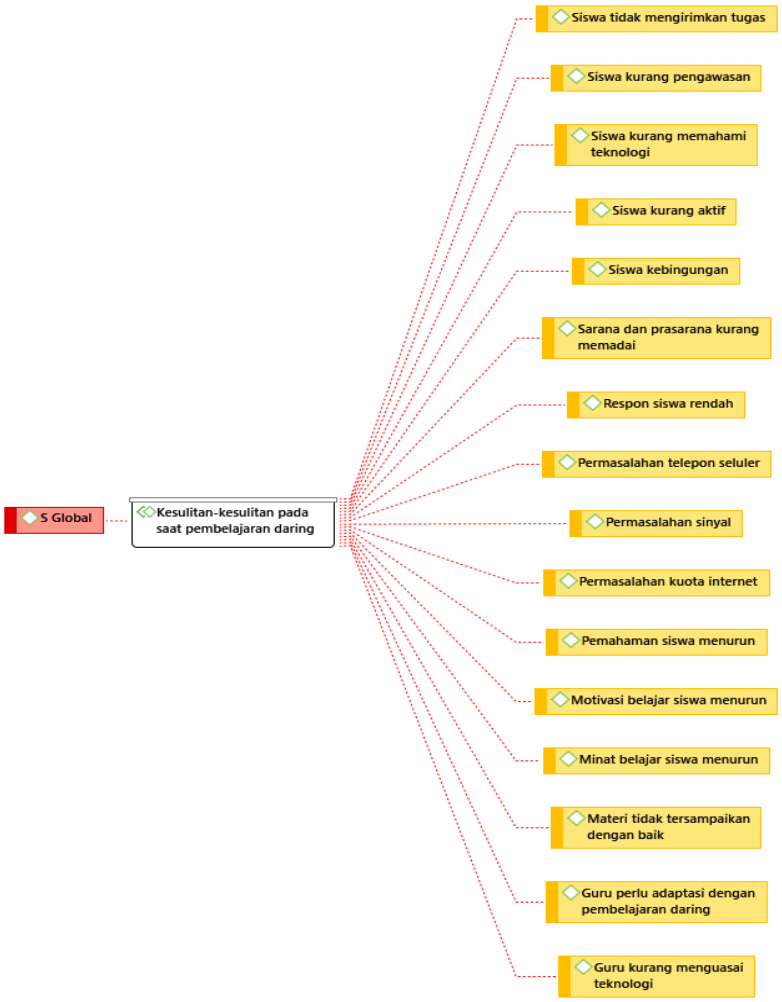

Figure 2. Data Coding Results About Difficulties Experienced by Data Sources Using the ATLAS.ti Application 8.

Based on Figure 2, the difficulties or obstacles experienced by data sources when learning mathematics online include students not submitting assignments, lack of supervision of students, students who do not understand technology, students are not very active, students look confused, facilities and infrastructure are inadequate (Bringula et al., 2021). Than student response is very low, cellular phone problems, network or signal problems, internet quota problems (Asio et al., 2021). Student understanding decreases, student learning motivation also decreases, material is not conveyed properly and some teachers need to adapt first to online learning (Puspitarini & Hanif, 2019). Based on the results of the study, teacher difficulties when learning online are caused by two factors, such as internal factors originating from the teacher himself and external factors originating from outside that caused by students such as lack of student motivation, low

student understanding and lazy students, then from the networks faktor and limitations of online learning media (Yohannes et al., 2021).

Table 1. The use of ICT by data sources

ICT Product	S1	S2	S3	S4	S5	S6	S7	S8
WhatsApp	√	√	√	√	√	√	√	√
YouTube	√			√	√			
Zoom Meeting		√						
Google Classroom	√	√	√				√	√
Google Form		√			√			
Google Meet				√				
Google Drive						√		
PowerPoint		√						
Blog Sekolah		√						
Geogebra		√						

The results of this study indicate that all participants use the WhatsApp application when online learning. besides whatsapp ICT which is also widely used is google classroom and youtube. This is in accordance with what was stated by Huda et al., (2021), in online learning, the platforms that are often used include WhatsApp, YouTube, and Google Classroom.

Table 2. Difficulties in learning mathematics online by data sources

Difficulties	S1	S2	S3	S4	S5	S6	S7	S8
Siswa tidak mengirimkan tugas			√					
Pemahaman materi siswa menurun	√	√		√	√	√	√	
Siswa kurang memahami teknologi						√	√	
Siswa kurang aktif				√				
Siswa kebingungan		√		√				
Sarana dan prasarana kurang memadai						√		
Respon siswa rendah						√		
Permasalahan telepon seluler						√		
Permasalahan jaringan		√						
Permasalahan kuota internet	√					√	√	√
Siswa kurang pengawasan								√
Motivasi belajar siswa menurun								√
Minat belajar siswa menurun	√				√		√	
Materi tidak tersampaikan dengan baik			√	√				
Guru perlu adaptasi terlebih dahulu						√		
Guru kurang menguasai teknologi					√			

The difficulties most experienced by data sources are caused by students, in addition to network problems and internet quotas are also widely felt by data sources. it is as stated by Tauhidah et al., (2021), constraints during online learning generally are network limitations and quotas.

Based on the research data above, it can be seen that the ICT products used when learning mathematics online by junior high school teachers in Indramayu are very diverse, due to various situations and conditions from schools, teachers, students and parents of students. Based on the results of the study, schools located in the city center were more varied in the use of ICT as an online mathematics learning medium compared to schools located on the outskirts of the city. The most widely used ICT product is the WhatsApp application. This is in accordance with opinion Purnama (2020), the WhatsApp application is a fairly familiar application because the WhatsApp application can be used to share important information and can be used for discussions in solving various problems and is also very helpful in communicating during online learning.

ICT products made by Google are also used by data sources in assisting the process of online learning, because every platform from Google can be used as needed. As stated by Fauzy & Nurfauziah (2021) the Google Classroom application is an application that is quite familiar in the context of online learning, and the application is also easy to use and does not consume too much internet quota. Septiawan (2020) the use of the Google Form platform is very helpful in the online learning process, especially as a medium for evaluation materials and is very helpful in the assessment process for students, because it is easy to use and practical.

The Google Drive application is already quite popular for students and teachers in the world of education in Bangkok, this is because students can access the material provided by the teacher at any time with several devices such as computers, smartphones, and tablets (Prasertsith et al., 2016). According to Trisnawati (2021), Google Meet is very suitable for online learning, because it can interact directly with students and the use of the application is relatively easy and can be used anytime and anywhere.

Youtube is also quite widely used in online mathematics learning, because YouTube can help students in re-learning the material given by the teacher. Sari et al., (2020) the use of YouTube application in online learning especially in mathematics can increase knowledge, skills and creativity, this is because learning to use the YouTube application is quite fun. Geogebra software is a computer program to support learn to teach math subjects, especially geometry, algebra, and statistics especially during online learning (Tamam & Dasari, 2021). GeoGebra is a great tool for teaching and learning geometry, algebra, and calculus. GeoGebra helps students to complete math tasks (Nzaramyimana, 2021)

The difficulties experienced by junior high school mathematics teachers in Indramayu when learning online are also very diverse, ranging from network problems and internet quotas, decreased student interest and motivation, students lack understanding of the material, and students who do not have media for communication such as smartphones, tablets and laptops (Yuzulia, 2021). That learning difficulties in learning online, namely internet access which is quite difficult in some areas, then students' learning motivation decreases, and students do not really understand the material presented by the teacher. In addition, researchers also obtained findings in online mathematics learning such as students feeling confused, material that was not conveyed properly and lack of supervision of students (Efriana, 2021). Difficulties in learning mathematics online are caused by several things, including the limited interaction space between students and teachers, too many formulas and symbols that make students confused and the objects studied in mathematics has an abstract pattern (Mulwa, 2015).

▪ CONCLUSION

Based on the results and discussion, this study concluded that the use of ICT products for junior high school mathematics teachers in Indramayu when learning online during the COVID-19 pandemic, including Zoom Meeting, YouTube, WhatsApp, PowerPoint, Google Meet, Google Form, Google Drive , Google Classroom, Geogebra and School blog. The combination of these ICT products can help the online learning process run optimally and achieve learning objectives, even if only through online. While the main difficulties for teachers when learning online are unstable networks and internet quotas.

The use of various ICT will make learning more interesting, because collaborative use of ICT can increase students' interest and motivation to carry out learning activities, and allow students to explore the material provided by the teacher on their own, thus very helpful in using ICT in learning mathematics, especially implented in online due to the COVID-19 pandemic. Constraints in implementing this study include the distance from each data source which is quite far so it takes quite a lot of time, and is constrained by schools is limitting the activities due to the implementation of online learning. Follow-up of this research will be carried out in the future, perhaps when the school has returned to face-to-face learning. The reasons put forward by teachers in this study regarding applications used in online learning can be considered, especially for teachers and institutions in designing and selecting the best applications, platforms, or teaching tools for online learning.

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