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THE PROJECT-BASED LEARNING FOR GEOMETRY DURING THE COVID-19 PANDEMIC

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ABSTRACT

The changing system in the current learning process at all levels of education due to the coronavirus pandemic. This study aimed to conduct literature review on project-based online learning during the Covid-19 pandemic and the impact on policies toward home learning activities. A project-based online learning system offers many ways to access learning materials for teachers and students. Many online learning platforms and media can be accessed for free. Some of the free platforms that have proven effective for managing online learning include Google Classroom and Edmodo. At least 12 free online learning resource applications can be used during the Covid-19 pandemic, including Rumah Belajar, ICANDO, Meja Kita, Indonesia X, Kelas Pintar, Google for Education, Microsoft Office 365, Quipper, Ruang Guru, Zenius, Sekolahmu, and Cisco Webex. Some obstacles in implementing online learning include limitations of the Internet and unfamiliar knowledge of teachers and students about the application of online learning media. Therefore, more effort is needed to address these issues, starting with individuals, families, educational institutions, providers, and government services.

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INTRODUCTION

The outbreak of the Covid-19 pandemic found in more than 200 countries has presented some challenges for educational institutions in Indonesia, where around 45 million students cannot continue learning activities in the school (Jamaluddin et al., 2020). The government has issued various guidelines, such as banning crowds, maintaining social distance, wearing masks, and washing hands (Wibowo & Afriyani, 2021). This activity requires residents to stay at home, work, worship, and study (Maria & Nurwati, 2020). Similar to what has been done by various countries affected by this virus, the lockdown policy is carried out to reduce the interaction of people who can accelerate the spread of the coronavirus (Abidah et al., 2020). Several countries, including Indonesia, have adopted policies to implement alternative learning processes for students who are unable to carry out learning activities at school. This is supported by circular number 4 in 2020 related to the policy of the education process in the emergency period of the spread of the Coronavirus (Arifa, N., 2020).

In some areas, home learning activities took place from March 16, 2020, and expanded considering the situation in each region. In terms of human resources, educators and students are ready. But many of them are forced to prepare for learning that is usually done conventionally in an online learning system. Schools accustomed to using technology tools in teaching and learning activities do not face many obstacles, but not for schools located in areas with limited installations on internet devices and networks (Arifa, N., 2020). Online learning connects teachers and learners who are physically distant but still able to communicate (Arizona et al., 2020). However, this online learning is certainly inseparable from obstacle detection in terms of implementation. In their research, Jamaluddin et al. (2020) described that many students still do not complete their online education due to limited quotas, unstable networks, and too many assignments. Rigianti's research (2020) found that educators are under-prepared for the transition to online learning. A study by (Roni Hamdani & Priatna, 2020) found that online learning does not work well if there is a lack of teacher training for online learning.

Online learning is meaningless without the synergy of the right teaching strategies and methods. One learning approach that can incorporate online learning is project-based learning (Arizona et al., 2020). The most important part of project-based learning is asking questions or tasks that highlight the compilation and initiation of activities that highlight the number of

projects to create a product. Project-based learning allows students to deepen concepts and improve learning outcomes. Sucilestari & Arizona (2018) described that project-based learning is an in-depth study of topics in everyday life. Structured projects enable learners to solve real-world problems and important questions daily, especially those related to the learning process.

Some educators practiced online learning in Indonesia before the government implemented social distancing. But the term online learning is becoming more and more popular after the social distancing policy. Online learning is more likely to apply to the form of the exercise through the application. Students were given problems to solve and then graded by the teacher as an assessment. Online learning can be used as a distance learning solution when a natural disaster occurs, such as when the government established a social distancing policy (Syarifudin, 2020). Therefore, online learning can be considered the only learning option used by educators to improve the quality of learning in Indonesia.

Project-based learning is an in-depth investigation of a real-world topic. A well-designed project requires students to face real-life problems and important questions in everyday life, especially in the learning process. You should realize that personal, social, academic, and professional skills don't work alone in real life. So, all life skills should be explained to students (Sucilestari & Arizona, 2018). Project-based learning emphasizes the quality of individual behavior and requires a different learning process. In other words, students have the freedom to plan learning activities, carry out collaborative projects, and ultimately produce products that can be presented. Thus, this research reviewed the project-based learning model for geometry during the Covid-19 pandemic.

METHOD

In this study, the literature review method was used. Data collection was done gathering the results of previous research related to issues in online learning during the Covid-19 pandemic. The data were then analyzed and concluded according to the needs that can solve a problem related to online learning.

RESULT AND DISCUSSION

Changes in Learning Due to the Covid-19 Pandemic

Due to the educational impact of the Covid-19 pandemic, continuous learning activities (Purwanto et al., 2020) are required even if students are not attending school. Teachers should

design their curriculum using online media. In this case, it is as if all education levels are forced to switch to interactive learning. This is considered for both students and teachers, and teachers, in particular, must create appropriate learning innovations (Jaelani et al., 2020). (Rigianti, 2020) study showed that the online learning process is new and challenging for teachers during the Covid-19 pandemic. At first glance, online learning may seem simple, but teachers and students only need a laptop or device and an internet network to conduct learning activities. Indeed, in the transition to the second week of learning activity, several obstacles were found in the implementation of online learning, including applications for online learning, internet networks, learning management, assessment, and monitoring (Rigianti, 2020). The current state of online learning is not ideal as there are still some hurdles to face.

Online Learning

Mathematics is one subject that requires effective and dynamic teaching strategies and methods to make it easier for learners to understand. Before the coronavirus outbreak, there were a lot of use of online media, especially social networks such as Facebook, WhatsApp, and Instagram, including in Indonesia. The same discussion by (Jaelani et al., 2020) explained that social media is a network that allows people to connect with others in a short amount of time.

Online learning is done the same way as formal learning done digitally over the Internet. Facilitate collaboration between teachers and students by creating virtual communications through online learning. The goal of online learning is to increase the effectiveness of learning activities (Popa et al., 2020). Previous research has shown many advantages of online learning over traditional learning. Studies (Elfrianto et al., 2020) show that online learning allows students to schedule learning based on their desired learning rate. This is consistent with research findings (Jaelani et al., 2020) that online learning is fun, allows learners to remember more, and can reduce learners' operating costs (e.g., travel and pocket money). Similarly, a study by (Sukmawati & Nensia, 2019) found that online learning can improve students' ability to participate in English language programs, especially the comprehension material.

There are many learning applications available in education these days. Google Classroom is one of the most popular free online learning applications. This application has the ability for each user to communicate in a virtual classroom. Teachers can also ask

questions and assign assignments to students (Warmi et al., 2020). Sabran & Sabara (2019) found that the overall implementation of educational activities using Google Classroom was very effective, with a trend rate of 77.27%. Online learning via the Google Classroom application allows teachers and students to access instructional videos, e-books or presentations, assignments (individual or group), and assessments (Arizona et al., 2020). The Google Classroom application allows teachers and students to discuss materials interactively. The recent Google Classroom application includes Google Meet, which allows you to make video calls.

In addition to the Google Classroom application, some teachers use the Edmodo. The application has almost the same interesting features as the Google Classroom, such as quizzes, gradebook, polls, files and links, award badges, library, assignments, and parent codes (Arizona et al., 2020). Edmodo application enables users to share interests, build collaborations, share resources, and connect. The application also has the advantage that parents can follow the learning activities, making it suitable for elementary and middle school students who need parent and teacher supervision. Ekici (2017) expressed that the efficiency of using Edmodo can be used as a virtual environment that connects theory and practical concepts through Edmodo application and can improve technical abilities and skills for building communication and collaboration. The quality of online learning using the Edmodo application in science classes showed good learning outcomes based on previous student evaluations by researchers. The use of the Edmodo application improved the learning skills of 8th-grade students at SMPN 2 Singaraja (Suriadhi & Tastra, 2014).

In addition to the two platforms above, there are more than a dozen well-known platforms for learning resources that students and teachers can access for free, as shown in Table 1.

Table 1. List of Free Online Learning Resource Platforms in Indonesia

No.	Platforms	Address
1	Rumah belajar	https://belajar.kemdikbud.go.id/
2	ICANDO	https://bit.ly/appicando
3	Meja Kita	https://mejakita.com/
4	Indonesia X	https://www.indonesiax.co.id/
5	Kelas Pintar	https://www.kelaspintar.id/
6	Google for Education	https://edu.google.com/
7	Microsoft Office 365	https://www.microsoft.com/id
8	Quipper	https://www.quipper.com/id/school/

No.	Platforms	Address
9	Ruangguru	https://ruangguru.com/belajar
10	Zenius	https://www.zenius.net/
11	Sekolahmu	https://www.sekolah.mu/kelasmu
12	Cisco Webex	https://www.webex.com/

Unfortunately, there are several obstacles to implementing online learning; teachers and students are not familiar with using online learning applications. Rigianti (2020) showed that some teachers struggle to deliver online learning, including learning applications, internet networks (data packets) and devices, learning management, assessment, and monitoring. Similarly, Jamaluddin et al. (2020) showed that Internet bundles, limited Internet access by teachers and students, and ignorance of online learning apps are the biggest barriers to online learning adoption.

The limitations of the Internet are a major concern from the point of view of educational institutions, governments, teachers, and parents who need good Internet services to conduct online learning according to the goals to be achieved. No matter how good an online learning platform is, it will not achieve optimal results without a suitable internet network. The good news is that several providers are offering special programs or free online services to access educational sites due to the Covid-17 pandemic.

According to the results above, online learning is not well known yet by teachers and students, and since they are already familiar with using the app, they have more access to WhatsApp media. This is certainly the trigger for all teachers and students to adapt and compete for access to the various online learning resource platforms.

The most important thing in applying online learning for students is to pay attention to many different aspects to achieve learning goals. Online learning has four important elements:(1) the material presented is related to the learning objectives to be achieved, (2) using teaching methods through examples and exercises to help students understand the content of the material, (3) using visual aids in the form of pictures and words to present the material, and (4) developing new knowledge and skills in line with individual goals and organizational improvement goals (Setyosari, 2020).

Project-Based Online Learning

Choosing the right learning method will provide a more optimal learning experience. One application of learning methods combined with online learning is project-based learning

(Arizona et al., 2020). Project-based learning can be an effective interaction that directs students towards developing products relevant to everyday life. Wulandari et al., (2019) found that project-based learning summarizes the main points of a teaching idea. It involves students in continuous question-and-answer activities, address student knowledge, and build awareness through an activity that encompasses students' skills and knowledge for students to create their knowledge through experience.

Several research findings showing the effectiveness of project-based learning include (Ardianti et al., 2017), who suggested that a project-based learning model can help increase students' creativity. Similar results were also shown by (Harahap & Ariani, 2019) that a project-based learning model improved grade 7^{th} students' reasoning skills, critical thinking skills, mathematical representation skills, and metacognitive. Wayan Rati et al., (2017) said project-based learning allows students the freedom to plan learning activities and undertake group projects, thus creating a more enjoyable learning experience. Likewise, Baharuddin & Jumarniati (2018) research results indicated that project-based learning allows students to become peer tutors to help other students who still do not understand the material. Likewise, students who do not understand the material should not hesitate to seek help from other students so that all students can understand the material provided.

Based on some of the above literature reviews, the project-based online learning model is processed with the following syntax: 1) Students are given basic questions related to problems in the material to be studied using online learning resource applications; 2) Students and groups develop a plan to solve the problem given by the teacher; 3) students and teachers organize a schedule to discuss problem-solving until they find a solution; 4) Teachers accompany student discussions through the application of online learning resources; 5) Students present their problem-solving results through online learning platforms; 6) Teachers provide feedback and evaluate student problem.

The Project-Based Online Learning as The Solution on Geometry Materials Due to The Covid-19 Pandemic

Geometry is an important planar concept for elementary school students (Utami et al., 2020). This is because there are many flat objects around the students. By studying geometry, you can develop logical thinking skills and improve students' problem-solving skills. Developing innovative learning models is necessary to improve student's math skills.

Project-based learning is learning in which the learner is directly involved in the learning content. This is theoretically supported, according to a statement by (Baharuddin & Jumarniati, 2018), that project-based learning is one of the learning models available for student engagement, and for this reason, education developers encourage project-based learning. A study by (Azizah & Widjajanti, 2019) confirmed that project-based learning has a completion phase. Here, the learner attempts to design the actions to be taken to find the answer; the learner attempts to solve problems and tasks and then is guided to make a decision. Learners are trained to use critical thinking skills.

Based on the different results presented above, project-based online learning can be a solution to optimize mathematics learning on geometry materials during this pandemic. Through project-based learning, students can learn in a meaningful way, making the acquired knowledge relevant and used to solve problems.

CONCLUSION

There are many online learning platforms and media that teachers and students can use for free. However, there are some barriers to online learning, including limited internet networks and the unfamiliar knowledge of teachers and students using online learning tools. Special effort is required to take advantage of this challenge. One teaching method that can optimize online learning is project-based learning. This learning model helps students delve deeper into concepts and improve learning outcomes. Project-based online learning provides educators and students access to the learning materials.

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