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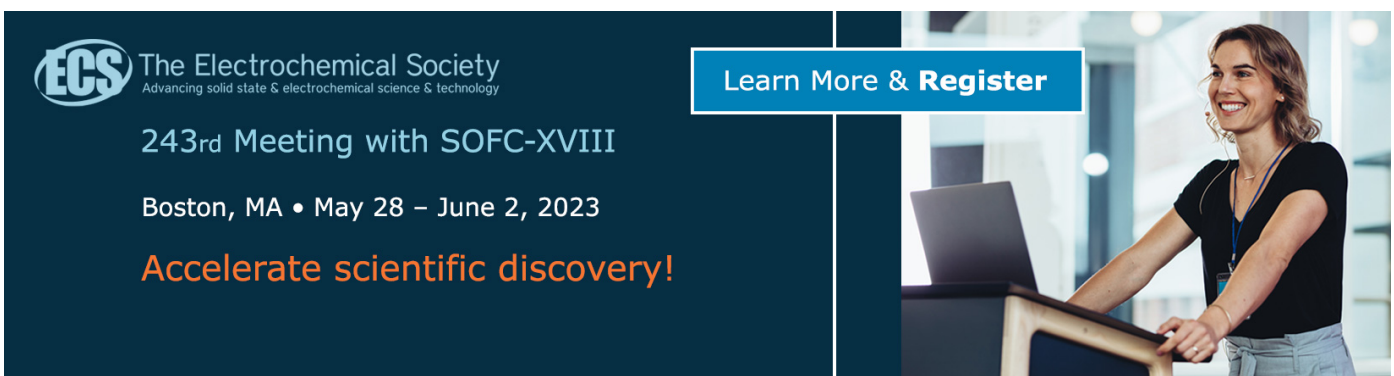
## Situation analysis of mathematical physics learning with online learning during the COVID-19 pandemic

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# Situation analysis of mathematical physics learning with online learning during the COVID-19 pandemic

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**Abstract.** This research was conducted to determine the situation of learning mathematics physics online during the COVID-19 pandemic. Participants in this study were physics semester 4<sup>th</sup> students of Universitas Muhammadiyah Makassar with 21 students. Data collection techniques include online interviews and questionnaires. The collected data analyzed by reduction, display, and conclusion drawing. The results of the study describe the learning process of mathematical physics not conducive during the COVID-19 pandemic outbreak. The problem that arises in the form of difficulty lectures in teaching explicit physics material that has many mathematical formulas and calculations. The difficulty on the part of students is that students experience limited costs to buy internet quota in online learning. The lecturer provides the solution by creating a mathematical physics module that is given in stages. This module is presented with language and examples of questions that are easily understood by students through the google classroom application. Lectures also occasionally use the zoom application, and Google meets to explain the material that is difficult to understand.

## 1. Introduction

In early 2020 a new virus known as COVID-19 (Corona Virus Disease 2019) hit the world through its spread in humans [1]. Corona-2019 virus (COVID-19) is a virus that infects the respiratory system and is now considered a pandemic by the world health organization [2]. The World Health Organization, on January 30, 2020, stated that COVID-19 is a disease, first reported from China in December 2019, and continues to spread in the world [3]. COVID-19 outbreaks spread in a speedy period to various countries [4].

The spread of the COVID-19 outbreak has hurt daily life, threatening human health, both physically, mentally, social development in the community and economic growth [5]. In some infected countries, the COVID-19 pandemic has caused panic, which caused the government to temporarily close crowded places, such as shops, markets, places of worship, and schools [6]. School closure is an effective preventive measure against COVID-19 because children can increase the transmission of the virus even if they do not show severe symptoms [7]. The closure of the school by the government resulted in changes in the learning process.

In Indonesia, the implementation of online learning. The online learning method is known as hybrid or blended learning. Hybrid or blended learning is learning that combines face-to-face learning and online learning [8]. Blended learning is a mixture of learning experiences with the help of technology in the form of sending content or material online. Parents can monitor the learning process at home [9].



Some applications used during the COVID-19 pandemic are WhatsApp group chat applications, Facebook, and so on [10].

The development of technology in Indonesia allows online learning to take place properly. Online learning is one of the essential things in the era of the industrial revolution of 4.0 [11]. Online learning contains information literacy learning material that can use in the long term as a substitute for student learning in the class [12]. Several previous studies have examined online learning, one of which is using the Edmodo application. Education Model Online (Edmodo) is one of the best learning applications that can increase effectiveness and high efficiency in learning [13]. Another research on online learning is Marcelino's research, 2019, which states the increase in students' confidence by using online learning, which can see from the activeness of students in participating in online learning [14].

Physics is a subject that is rich in knowledge, and the laws of physics always expressed in the form of mathematical equations [15]. Mathematical physics is a core course in the physics education study program at the Universitas Muhammadiyah Makassar. Mathematical physics is a tool for students in analyzing various physics problems through accurate calculations such as Optics, Mechanics, Core physics, and so on [16]. The focus of the problem in this study is how the situation of learning mathematics physics with online learning during the COVID-19 pandemic.

## 2. Methods

This research is qualitative. Participants in this study were physics students in semester 4<sup>th</sup> Universitas Muhammadiyah Makassar as many as 21 people and lecturers in Mathematics Physics as much as two people. Data analysis using interviews and questionnaires. Interview participants online. Online interviews using the zoom and google meet applications. While filling out the surveys was given to students and lecturers through the google form application. The interview and questionnaire aim to get information about the situation in learning mathematics physics online. The indicator of interview questions and filling out the surveys focuses on the condition of the learning process of mathematics physics online, the difficulties of students and lecturers in learning mathematics physics online, as well as the strengths felt by students as participants who take part in learning mathematics physics online.

The data obtained were then analyzed using the method of data reduction, data display, and verification, or concluding. In the data reduction stage, the researcher sharpens, focuses the data and discards unnecessary data so we can make conclusions. After the data reduced, the next step is to display the data. The data explained the narrative. The presentation of data begins by describing the results of the study, namely, data obtained from researchers through triangulation and data reduction; then, the analysis in the discussion. The final stage in qualitative data analysis is drawing conclusions and verification. At this stage, we discover new facts. This data is obtained from the results of data reduction and data display, and then data conclusion.

## 3. Result and Discussion

Based on the results of interviews and filling in the questionnaire of participants (lecturers and students) at the Universitas Muhammadiyah Makassar on the application of online learning in Mathematics Physics courses can be described as follows:

### 3.1. Based on the response of physical education students at the Universitas Muhammadiyah Makassar

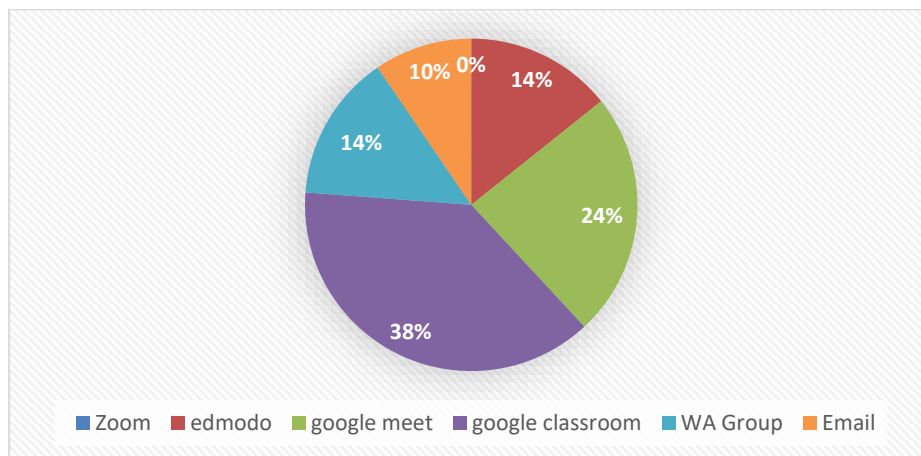
(1) Learning mathematics physics online using google classroom and Edmodo is more efficient in using internet data, (2) Students find it difficult to understand mathematical physics during online learning, (3) For students who are in the area, the unstable internet network often disrupts the online learning process, (4) Students lack concentration in participating in online learning because of other activities compared to face-to-face learning in the classroom, and (5) Students who have low learning motivation, sometimes do not care about the task and will be left behind by their friends. The diversity of students' knowledge when mastering mathematical physics material also becomes an obstacle to online mathematics physics lectures [17]

### 3.2. Based on the response of mathematics physics lecturers at the Universitas Muhammadiyah Makassar

(1) Learning mathematics physics during the COVID-19 pandemic begins with the use of the Google Met application. However, not all students can attend lectures due to limited costs (internet quota) and unstable internet network conditions, (2) Mathematical physics lecturers have difficulty in explaining calculations and deriving formulas. Usually, the lecturer writes on the board before the COVID-19 pandemic, (3) Not all students can be present on time when studying online, and (4) Lecturers prefer learning mathematics physics that takes place in class compared to learning online.

From the research data obtained from the speakers explained that learning mathematics physics during the COVID-19 pandemic raises new problems in learning. The question that arises is the difficulty of lecturers in explaining the material, especially the use of mathematical applications in physics online. Usually, the lecturer explains on the blackboard directly. It was also felt by students.

Of the several online learning applications that are used, several applications that are suitable for learning mathematics physics online. Based on the opinion of students and lecturers of mathematical physics, the form can be seen in the following diagram :



**Figure 1.** The suitable online application applied to the learning of mathematical physics during the COVID-19 pandemic

Based on the results of interviews with students obtained data from 21 students, there are about 38 % of students prefer lectures on mathematical physics using the google classroom application and no students. They like lectures on mathematical physics with the zoom application. Some reasons are given by students who prefer online mathematics physics lectures with google classroom. The idea is that the google classroom application is easy to use, especially in uploading assignments, as well as working on quizzes given by lecturers. In accumulation, in this application student's, can easily download learning materials that have been provided by lecturers. The google classroom application is also easily accessible. In terms of cost, google classroom uses internet data that is lower than using zoom. So the costs incurred are relatively less. In count, the next application, which is also suitable for use in learning mathematics physics, is google meet. With this application, the lecturer can display learning material, and students can listen directly to the explanation from the lecturer. In terms of cost, google meet is also considered to be less using internet data quota compared to using the zoom application. Edmodo and Whatsapp Group applications have a percentage of 14 %, both of these applications are easily accessed anywhere, even though the internet connection is not suitable, it also does not use large data quotas. But in using Edmodo, students have difficulty downloading material that has a large file size. At the same times, the use of WhatsApp groups is more for discussion of learning material. The zoom application used at the beginning of learning mathematics physics online is not desirable and is felt to be less suitable in online mathematics physics lectures. It is because accessing this application requires a good internet

connection, whereas most students are not in the city; they are in their respective villages. So that not all students can be present on time when lectures are carried out via zoom.

Another difficulty that arises during the online mathematics physics learning process is that learning situations are not conducive; not all students can be present on time. It is due to the unstable internet network in its location. Besides, the limited cost of buying internet data quota is one factor that is not conducive to learning mathematics physics online. Home learning activities during COVID-19 require parental support. Parents with high economic status provide more academic support (in the form of computers and the provision of internet or wifi data at home) than parents with low economics [18].

Of the various difficulties experienced by lecturers and students, the solution that can be given is mathematics online physics lectures with zoom or google met conducted only a few times during the conference. The rest can use the google classroom or Edmodo application, which uses relatively less data quota compared to zoom and google met. Another solution, lecturers create online modules that are presented little by little for each teaching material, made in the form of pdf files so that students more easily download the module. Furthermore, it is provided through the google classroom or Edmodo application as literacy material [19]. The material should be given for two meetings, so students can study the material early before entering the next meeting .

Giving assignments and quizzes can be done on the google classroom application. In demand, there are features giving assignments and exams, which can be arranged in the form of questions and time limits for the process. Besides, it's for tasks or -quizzes.

From the description of online mathematics physics learning related to the difficulties of the lecturers and students, it shows that the learning process of mathematical physics in the classroom is more effective than the mathematics learning process online. Regardless of how online the students' learning experience is, the main goal of education is how students can continue to study well during the COVID-19 pandemic [20].

#### 4. Conclusion

Based on the results of interviews and questionnaires about the situation of learning mathematics physics during the COVID-19 pandemic conducted online it can be concluded that the case of learning mathematics online during the COVID-19 epidemic is less effective, lecturers have difficulty in delivering mathematical physics material that has many calculations and formulas mathematics; students have difficulty in understanding the material, limited student fees for buying internet quota, also unstable internet network.

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