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The Use of Google Classroom in Physics Course: Students' Perception

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Abstract.
The use of the learning management system (LMS) in online learning has impacted the development of science and technology in the field of education. One of the major LMS that is frequently used today is Google Classroom. This study intends to evaluate student impressions of utilizing Google Classroom as an LMS in online physics learning. The method utilized by the researcher is the qualitative method. A total of 12 physics education students from one of the universities in Indonesia were involved as respondents in the interviews performed. The interview data were evaluated through the stages of organization, transcription, exploration, coding, theme formulation, and description based on the theme. The conclusions in this study consist of advantages, disadvantages, challenges, and suggestions for Google Classroom as an LMS relating to accessibility, connectivity, features, navigation, notifications, data plans, bandwidth, device memory, and display. A further study employing more respondents or from a teachers' or lecturers' perspective can be undertaken to provide a more comprehensive understanding of student perceptions of using Google Classroom as an LMS.

Keywords: google classroom, physics course, students' perception

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1. INTRODUCTION

The progress of science and technology is proliferating and achieving extraordinary acceleration [1–3]. The rapid advancement of technology has affected daily life, such as the economy, politics, culture, art, and education [4, 5]. The rapid development of technology in the 21st century is changing education and the educational process [6–8]. These technological developments play a significant role in improving the modern education system at various levels of learning, be it school, college, or university education [9]. The educational model has now proven that most educational activities cannot be separated from the practice of technology [10]. It can be seen from the many educational innovations that use technology to support the learning process so that it becomes a catalyst in increasing knowledge and competence in order to maintain

the learning experience of students [1, 11–14]. Technology has also changed the role of teachers in guiding, planning, directing, facilitating, and regulating the teaching and learning process [15].

One manifestation of technological developments in education is e-learning [5]. E-learning has transformed adaptive learning, collaborative learning, and how teachers function [16]. E-learning aims to expand access to education and encourage students to acquire knowledge easily, without being limited by space and time, interactively, and effectively [5, 13]. E-learning is widely applied in online learning that can be done flexibly and adaptively [17].

In its implementation, e-learning or online learning requires electronic devices such as tablets, smartphones, laptops, and computers and requires an internet connection and other media such as websites and applications [18, 19]. In addition, a stable and up-to-date system, cost-effective [20], and easy to adapt [6] is also required. One of the popular systems to support online learning is the Learning Management System (LMS). LMS is one of the most widely used learning technologies in higher education [21]. LMS uses various pedagogical technologies while offering an enabling infrastructure to manage administration, learning activities, learning content, communication, assessment, and collaboration [22–24]. Some of the leading LMS educational institutions use are Moodle, Edmodo, Desire2Learn, Blendspace, Blackboard, Google Classroom, Sakai, Fronter, and others [25].

Google Classroom is one of the fastest-adopted online learning platforms [26]. Some advantages supports this. As one of the innovative technologies that unites teachers and students in an online virtual space to enhance the learning experience, Google Classroom provides quick and easy access to learning content, secure cloud storage, collaboration, management, and communication platforms that facilitate online classes without effective paper [9, 15, 27, 28]. In addition, Google Classroom has also proven to be cost-effective, accessible, and user-friendly [25].

The successful implementation of Google Classroom depends on the perceptions and experiences of students [1] in Ansong-Ghyimah. Students' perception is one of the most important elements in considering the success of online learning [29]. As the center of the teaching and learning process, it is essential to know the students' perceptions of Google Classroom to determine the effectiveness of the teaching and learning process using Google Classroom. However, research related to Google Classroom as an online learning platform is still limited [20, 30], especially in identifying the challenges and benefits of implementing this system [30]. Several studies related to students' perceptions of the use of Google Classroom in previous lessons discussed

the advantages of Google Classroom [31], the advantages and disadvantages of Google Classroom [32], and the convenience and usefulness of Google Classroom [33]. A comprehensive exploration of various aspects through qualitative research on students' perceptions of the use of Google Classroom in online physics lectures is still limited. This study aims to explore student perceptions of using Google Classroom as a Learning Management System (LMS) in online physics lectures.

2. METHOD

2.1. Research Method and Participants

The method used in this case study research is a qualitative method. Twelve students of physics education at a university in Indonesia were the respondents. Respondents consisted of 3 men and 9 women. This research was conducted in the even semester of the 2021/2022 academic year.

2.2. Data Collection and Instruments

Data was collected through semi-structured interviews. Respondents were interviewed one by one online using Zoom for a duration of 30-45 minutes. Interviews were recorded live using features on Zoom. Interviews were conducted to determine student perceptions of Google Classroom based on student experiences during online physics lectures. The instrument in this study consisted of an interview guide.

2.3. Data Analysis

Data in the form of interview recordings via Zoom were analyzed through six stages [34], namely organizing data, transcribing data, exploring general descriptions of data, coding data, developing themes from data, and describing data based on themes. At first, the researcher organized the data by separating the data originally in the form of video into audio and visual. Furthermore, the researchers transcribed the recorded interview data in audio into text. Then the researcher explores the general insight of the data by carefully reading all the data twice to find an overview of the data. Next, the researcher coded the data by dividing the data into several segments of information with codes. After coding the data, the researcher developed a theme by grouping similar or cognate codes and then combining them into themes. Finally, after

developing themes from the data, the researcher described them based on these themes. In this study, there are four themes: the ease of using Google Classroom, difficulties in using Google Classroom, challenges in using Google Classroom, and suggestions for improving Google Classroom performance.

3. RESULTS AND DISCUSSIONS

3.1. Advantages of Using Google Classroom

Based on the interviews, researchers realized that students felt some convenience in physics lectures by using Google Classroom. The convenience felt by respondents is related to accessibility, connectivity, storage, features, and navigation. In terms of accessibility, Google Classroom makes it easy for students to access various devices ranging from PCs, laptops, and tablets to mobile phones. Students can also access it via the web or mobile application. Registering and joining classes is also easy and fast because students only need to have a Google account. Furthermore, teachers only need to share class codes to create groups and let students join online classes and participate in class [35]. It makes it easier to start classes and provides security [36].

"I can access Google Classroom easily anywhere and anytime. It can be accessed via the web or mobile application. When I'm at home and open my laptop, I access it via the web, but when I'm out of the house or on a trip, I access it via a mobile application because I always carry my smartphone with me wherever I go." (Respondent 5)

"I already had a Google Classroom account before, so I just had to go to Google Classroom and join the class using the code given by the lecturer. The process is easy and fast." (Respondent 2)

In terms of connectivity and storage, Google Classroom is integrated with various Google products familiar to them, such as Google Drive, Google Doc, Google Slides, and others. This made it easier for students. All files viewed, uploaded, or downloaded from Google Classroom are stored in cloud storage, namely Google Drive. This cloud-based storage model helps teachers and students to store a large number of learning material files (Diana et al., 2021). In addition, the process of correction and revision of assignments can be done many times without having to upload or re-upload via Google Doc. It makes communication, sharing, and feedback can also be carried out effectively [35].

"In Google Classroom, lecturers often give assignments via Google Doc. If there is feedback from the lecturer there, I can revise the assignment without having to download and re-upload it." (Respondent 7)

Another convenience expressed by students is that Google Classroom's features and navigation are pretty simple and easy to use. Students revealed that uploading, downloading, viewing grades, viewing assignments, and other activities can be done easily and quickly because the features and menus are easy to find. Switching between menus only takes a relatively short time, and this will save time [37].

"The menus and features in Google Classroom are minimal and easy to use. When I want to search for a particular menu or feature in Google Classroom, I can do it easily and quickly. There are almost no submenus. Many menus and features are displayed on the front page." (Respondent 12)

3.2. Disadvantages of Using Google Classroom

In addition to the various conveniences obtained, the researcher realized that students also felt difficulties learning physics by using Google Classroom. The difficulties felt by students were related to accessibility, features, and notifications. In terms of accessibility and features, students find it difficult to find previous posts easily in a short time in Google Classroom. In Google Classroom there is no menu or feature that groups posts based on specific times, meetings, materials, or categories so students have to browse through the posts one by one in Google Classroom.

"Many posts and comments on Google Classroom from lecturers and students related to information and learning activities arranged from oldest to newest. When I want to find and reread previous posts, I have to scroll down and skim through each post before finding the post I'm looking for. It is often difficult and takes a long time" (Respondent 5)

Google Classroom helps teachers provide students input and encourages students to discuss through comments [19]. Students revealed that they had difficulty writing an equation in posts or comments related to mathematical equations or physics formulas. In the posting column, students must first type the mathematical equation or physics formula in Microsoft Word or other applications and then convert it into an image so that it can be inputted into Google Classroom. Meanwhile, in the comments column, students cannot input images, so mathematical equations or physics formulas that have been typed in Microsoft Word or other applications cannot be displayed correctly and

adequately in Google Classroom. It is because the input is always presented in linear form in the post or comment column.

"In online lectures, lecturers often provide opportunities for students to ask questions or discuss related processes and lecture materials. One of the difficulties I experienced was that I could not write mathematical equations or complex physics formulas directly. I have to type it first in Microsoft Word and then transfer it to Google Classroom or convert it into an image."(Respondent 8)

Another difficulty experienced by students related to accessibility is that not all files can be directly viewed or opened. Files with specific extensions such as rar or zip, animation files, and large files must be downloaded first before they can be viewed or opened. Playing specific videos sometimes doesn't work and takes time to load [37]. It makes students uncomfortable. In addition, Google Classroom, which is accessed via the mobile application, is slower than the web. Meanwhile, most students revealed that they use smartphones more often than PCs or laptops.

"Lecturers have shared learning videos and other files with quite large sizes. I can't open it right away so I have to download it first. Especially when I access it via the mobile application, I have to wait longer because it is slower than the web. So, for me, this is quite inconvenient and tedious." (Respondent 9)

Notifications seen through mobile applications have factors that influence student engagement and have been found to motivate students to be more committed to learning [38]. Students revealed that notifications from Google Classroom via Email were slower than notifications from the mobile application. Therefore, students who access Google Classroom via the web are often late and even miss information and learning activities. They realized this after receiving notifications related to activities in Google Classroom which were not real-time.

"I am often late in finding out information and lecture activities in Google Classroom because I just received a Google Classroom notification in email. It turned out that after I checked, Google notifications a few minutes after the information related to lecture activities was posted." (Respondent 7)

3.3. Challenges in Using Google Classroom

From the interviews that have been conducted, the researchers found several challenges experienced by students in online physics lectures using Google Classroom. These challenges include internet connection, data packets, bandwidth, and device memory. Internet connection is essential in online learning, including Google Classroom

[19]. Without an internet connection, Google Classroom cannot be accessed [39]. A weak internet connection will also make it difficult for students to access Google Classroom [11]. Students revealed that they were often constrained by internet connection and bandwidth when attending online lectures. Students complain about unstable internet connections when accessing Google Classroom and low bandwidth when downloading data.

"When taking online lectures using Google Classroom from my hometown. There I often had problems accessing Google Classroom because of an unstable internet connection." (Respondent 8)

"I often feel annoyed and bored when downloading files in Google Classroom. Low bandwidth makes it take me a long time to download files shared in Google Classroom." (Respondent 4)

Another challenge faced by students is related to the device memory. Problems with devices are challenges that students must face when enjoying learning using Google Classroom [19]. Students revealed that they had problems with device memory, especially when installing the Google Classroom application on their smartphones and downloading files in Google Classroom. Students revealed that their RAM and internal storage capacity were limited, so they sometimes deleted other applications and other files to run the Google Classroom application and download files in Google Classroom smoothly.

"After installing the Google Classroom application, my smartphone response was slow because my RAM and internal storage were limited. Therefore I decided to uninstall some other applications. After that, my smartphone response was back to normal." (Respondent 10)

3.4. Recommendations for Improving Google Classroom Performance

In interviews, students gave several suggestions for improving the quality of Google Classroom as a Learning Management System (LMS). These suggestions relate to displays, features or menus, and notifications. Regarding the appearance, the students revealed that the current appearance of Google Classroom is less attractive, and the colors used tend to be plain. Students often find it difficult to distinguish between LMS courses because they look almost the same.

"In my opinion, the appearance of Google Classroom is less attractive and boring. Almost all Google Classroom courses have the same appearance, so sometimes, I

find it difficult to tell them apart. A colorful display with a background according to the course will be much more interesting and impressive" (Respondent 3)

Students revealed that Google Classroom displays all posts in the same page and menu regarding features or menus, namely Stream. All posts are displayed continuously starting from the new to the old. It is difficult for students to find certain information because posts are not grouped based on specific meetings, times, themes, or categories, and students have to scroll down and read the posts to find the information they are looking for. The existence of a menu or feature that groups posts based on meetings, times, themes, or specific categories is deemed necessary to make it easier for students to find specific information quickly.

"One of the boring and sometimes annoying things when using Google Classroom is when I want to find a specific post, I have to scroll down the home page, which contains many posts from various meetings and topics. We recommend that Google Classroom provide a menu or feature that groups posts based on certain meetings, times, themes, or categories so that finding certain information in posts can be easier" (Respondent 6)

In addition, a private message feature or menu between students also needs to be added, said the student. They revealed that sometimes they are shy and embarrassed to ask something openly in Google Classroom because the teacher and all students can read the post or comment. The existence of a feature or menu that allows students or participants and lecturers to communicate personally can help students who have problems related to learning. This will make communication more developed, not only between teachers and students but also with fellow students.

"Sometimes I want to ask about the instructions and assignments from the lecturers that I don't understand to the lecturers or friends. But I'm embarrassed to ask this openly in Google Classroom because all students and lecturers can read it. I feel more comfortable if I can ask personal questions to lecturers or friends in Google Classroom. In my opinion, a menu that can allow this to happen is needed.." (Respondent 12)

Students revealed that Google Classroom had provided them both via email and applications regarding notifications. However, notifications via the web, notifications related to unfinished tasks, and notifications regarding users who tag or mention do not yet exist. They revealed that the notification via the web would make it easier for them to find out information related to lectures so they don't need to open an email first or install the application on a smartphone. Furthermore, notifications related to tasks that have not been done will also help remind them to do assignments so that no tasks are

forgotten or missed. Then, notifications regarding users who tag or mention may also need to be added to make it easier to interact.

"I often forget to do assignments given by lecturers through Google Classroom because I am busy, and there are no notifications regarding the unfinished tasks. If there is a notification regarding this, it would be beneficial." (Respondent 3)

4. CONCLUSION

Google Classroom as a Learning Management System (LMS) in online physics lectures provides several conveniences for students related to accessibility, connectivity, storage, features, and navigation. However, there are still several difficulties and challenges experienced by students related to accessibility, features, notifications, internet connections, data packages, bandwidth, and device memory. In addition to improving the quality of Google Classroom regarding appearance, features, and notifications, it is also expected that the use of Google Classroom as a Learning Management System (LMS) is more optimal.

This study captures the perceptions of twelve physics education students who take online physics lectures. Other researchers can carry out similar research involving a larger number of students to obtain more information related to students' perceptions of Google Classroom. In addition, lecturers' perception of Google Classroom can also be done to obtain information from other perspectives so that the description of the experience of using Google Classroom is more comprehensive.

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