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Research Article

Utilization of e-learning platforms by lecturers during the COVID-19 pandemic in Indonesia

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ABSTRACT

The current COVID-19 pandemic forces the educational field to adapt to e-learning to continue teaching and learning. This study aimed to analyze the use of e-learning platforms during the COVID-19 crisis, especially in the biology education program. This study used a quantitative survey design. Through purposive sampling, 100 lecturers from 43 universities in Indonesia participated in this study. Data collection was carried out by using an online questionnaire. Data were analyzed using descriptive statistics and thematic content analysis. The findings showed that WhatsApp, Google Classroom, and Zoom remain the most used e-learning platforms in Indonesian universities due to their accessibility and affordability. Participants' obstacles during online learning centered on the limited network and quota as well as controlling aspects. Suggestions for further online learning are providing internet quota assistance, infrastructure, and network refinement and planning a comprehensive and careful learning design. The findings of this study can be a reference for biology education lecturers as well as universities officials in determining and using e-learning platforms during COVID-19 to improve online learning in Indonesian higher education during the pandemic.

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INTRODUCTION

Online learning has become a common teaching method due to the rapidness of technology and internet infrastructure enhancement (Pei & Wu, 2019; Wang et al., 2021). Online learning has led to transformative pedagogy that help universities overcome challenges regarding the shortage of faculty members, the increasing number of students, lack of teaching resources (Wang et al., 2021) and time or space issues (O' Shea et al., 2015). Online learning can be in the form of education using the web, blogs, online discussion,

social media as well as online materials, resources and assessments (Rasmitadila et al., 2020; Sturm & Quaynor, 2020). Another online learning facility uses a Learning Management System (LMS) on Moodle (Rasmitadila et al., 2020), a software that manages web-based learning.

Previous studies reported the advantages and disadvantages of online learning. The benefit of online education, as reported by Lahti et al (2014) and Sezer (2016), are time management and communication skills improvement and the easier knowledge application. Meanwhile, the shortcoming of online education are interaction limitation and technical difficulties (Fadlelola et al., 2019; Knipfer et al., 2019). Despite its shortcoming, online education has become a well-accepted strategy for higher education to face the rigid challenges of COVID-19 pandemic. Physical distancing that led to the closure of university found another raising problem (Murphy, 2020; Scull et al., 2020), which are the need of continuous teaching and learning (Wang et al., 2021).

The current COVID-19 pandemic condition forces learning that usually takes place in class to be switched online (Cutri et al., 2020; Hill et al., 2020; Moorhouse, 2020). This kind of condition called as emergency e-learning (Murphy, 2020) or emergency remote teaching (Bozkurt & Sharma, 2020; Kalloo et al., 2020) comprises wide range use of online learning platforms (Lederman, 2020; Verma et al., 2020). Reimers et al. (2020) released OECD's annotated set of resources consisted of online educational resources such as curriculum resources, professional development resources ant tools (Zoom, Kahoot, Google Classroom, Seesaw, Moodle, Microsoft Team and many more) in supporting the continuation of teaching and learning amidst COVID-19 era. Those planning or enhancing an education continuity plan may do it either by integrating any of these tools directly into their plan or by using them as a model for creating their own online educational materials.

In the Indonesian context, Ichsan et al (2020) and Khaleyla et al (2021) have previously conducted the latest research about online learning during COVID-19 pandemic. However, the context of this study is in secondary school and have yet to focus on online learning in higher education especially in Biology education program. Furthermore, a study carried by Suryaman et al (2020) about the profile of online learning in Building Engineering Education Study Program during the COVID-19 pandemic only briefly discussed the platform used by lecturers in conducting online learning. Following the aforementioned rationales, the purposes of this study were to: (1) find out the type of e-learning platform used by Biology and Biology Education lecturers in Indonesia during the COVID-19 pandemic; and (2) find out how to determine and use an appropriate e-learning platform for home education amidst the COVID-19 crisis as well as challenge and constraints encountered. This study is needed to bring some insights into what should be considered by college teacher to better improve their teaching quality during COVID-19 pandemic. The findings of this study also can be used as consideration for universities and government regarding the selection of e-learning types and to determine online learning policy.

METHOD

This research was designed as a quantitative survey study, which was conducted on August 3rd until October 12th, 2020. Survey was carried out to find out the online learning platform preference of Biology and Biology Education department lecturers in Indonesian universities during the COVID-19 pandemic.

The population target of this study comprised of 150 faculty members of Biology and Biology Education department in Indonesian higher education. The survey population consisted of individuals who willingly agreed to take part in this study. Data related to participant involved were obtained through exploring the website of study program, which included e-mail details and telephone numbers. For a convenient case strategy, the universities were selected based on purposeful sampling. Anchored in Creswell (2012), this sampling technique was used to easily access the existing data. In addition, participants were also recruited from WhatsApp group of *Himpunan Pendidik dan Peneliti Biologi Indonesia (HPPBI)* (in English: Association of Indonesian Biology Educators and Researchers) consists of Indonesian Biology educators and researchers for North Sumatera and Central Java region (N=146), biology education postgraduate group of several universities in Indonesia (N=15) as well as from a personal approach through researchers' college. Participants are chosen based on their experience of online teaching in universities during the pandemic, particularly biology and biology education lecturers. Collecting data from participants was carried out with due observance of research ethics by asking their willingness to be involved as participant in a survey conducted through a negotiation via e-mails and WhatsApp messages.

In this study, data collection was carried out by distributing a questionnaire containing several short open-ended and multiple-choice questions to participants via Google Form. These questions consist of: (1) identity (gender and institution); (2) platforms frequently used for online learning; (3) reasons for using the platform; (4) unfamiliar platform types; (5) obstacle on using platforms for learning during pandemic; and (6) suggestions for Improvements to online learning in the future. Notification for filling out the questionnaire was distributed via e-mail and WhatsApp containing information on the identity of researcher, the purpose of the survey, a link to open the online questionnaire as well as a request for statement of the participants' willingness to fill out the questionnaire. Prior to the actual official start of this project, a pilot study was performed to assess the suitability of the design and methods of the survey, the chosen method of data collection, and the overall questionnaire structure. The pilot study consisted of six lecturers from the college who met the target population requirements and decided to fill out the questionnaire voluntarily. The findings of the pilot study, in the form of supplementary questions, resulted in a revised questionnaire. An additional issue is related to the reasons for selecting the platform used during the COVID-19 pandemic for online learning. The data collected from the pilot study participants was included in the overall study data.

The data obtained related to the frequently used online learning platform and constrains felt by lecturers in using those platforms were analyzed with descriptive statistics. The researchers repeatedly read the answers obtained from questions on the questionnaire to make them more familiar with the quality of the answers given. In order to identify trends and themes that arose from the responses of the participants, thematic content analysis was carried out (Gay et al., 2012). In graphical form, the five themes with the highest percentage for each question category are displayed.

RESULTS AND DISCUSSION

As of 100 of the initial 150 questionnaires were given by participants, this study achieved a response rate of 67%. Participant consists of 27 males (26.32%) and 73 females (73.68%) from 63 national universities and 37 private universities. To obtain data on the most used online learning platform during the COVID-19 pandemic, participants were asked to choose the list consisted of twelve online platforms. Survey data on the most used of platform during the pandemic was presented in Figure 1. Figure 1 shows that there are three most used online platforms during the COVID-19 pandemic which were WhatsApp (34.11%), Zoom (18.6%), and Google Classroom (15.5%). Meanwhile, the most rarely used e-learning platform are Miro, Trello and Seesaw. There are 8.53% participants who answered other than e-learning platform that was given in the questionnaire.

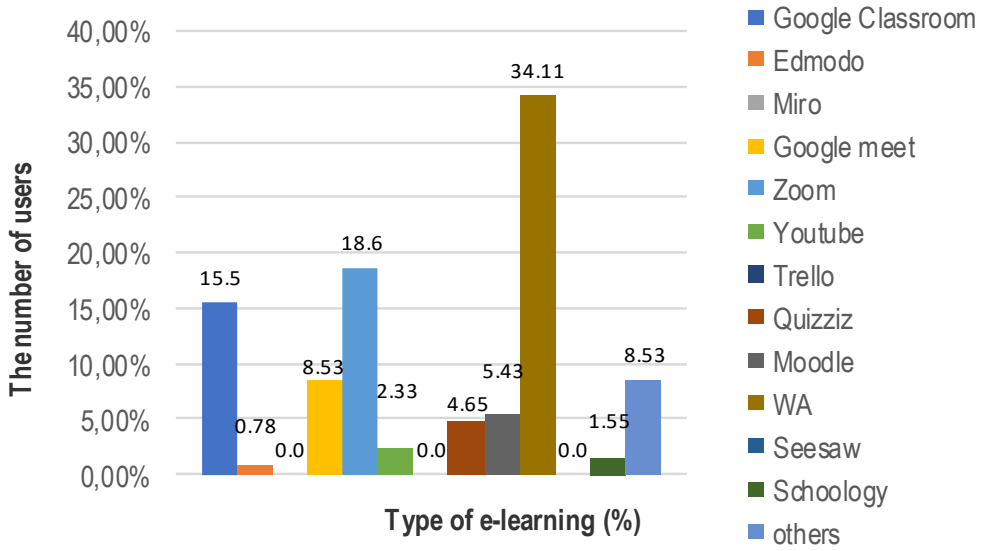

Figure 1. Platforms of e-learning during the COVID-19 pandemic

This study provides insights into the online learning platform preference of Indonesian higher education faculty members during home education in the COVID-19 era. The findings showed that WhatsApp was the most widely used platform in the online learning process in universities during the pandemic period. This finding aligns with that of Coleman and O'Connor (2019) that WhatsApp has become a popular platform used

to support learning in the last decade. Previous studies have found similar findings, with WhatsApp and Google Classroom being the most used platforms for online learning throughout the pandemic (Faizah et al., 2021; Khaleyla et al., 2021). WhatsApp is more popular because students are more familiar with the features (Mpungose, 2020). Almost all people from various backgrounds and ages have WhatsApp accounts. Young adults (18-34 years), including university students, always actively use WhatsApp to communicate with friends and family (Matassi et al., 2019). WhatsApp in the learning process is also known to help achieve learning goals (Zulkanain et al., 2020) and enhancing the learning experience (Madge et al., 2019).

Following WhatsApp, Zoom is the second most preferred platform, with Google Classroom coming in third. This findings is in line with Ratnawati and Nurhasanah's (2021) study, which found that students responded positively to Zoom and Google Classroom in synchronous learning. Zoom is one of the most popular learning platforms today because it is simple to use and has a wide range of functions (Kohnke & Moorhouse, 2020). Lecturers even consider Zoom as an effective platform to support online learning (Mpungose & Khoza, 2021). Meanwhile, as one of Google's product, Google Classroom can be used as an alternative to face-to-face learning during the pandemic (Basilaia, 2020).

Unlike WhatsApp, Miro and Seesaw are the most rarely used or never used in online learning during the pandemic period in this study. Miro is a platform that takes the form of an unlimited whiteboard with various tools that multiple individuals can utilize at the same time to accommodate classroom discussions. Seesaw is a digital portfolio platform that allows students to organize, assess, and reflect on their work in one place. Educators' knowledge of various learning platforms can influence their usage. Advances in technology have been followed by advances in education (Bernacki et al., 2020).

To collect data on what is the reason of participants' e-learning platform preference, participants were requested to responds the question "What is the reason you chose the e-learning platform used during the pandemic? Content analysis of the answer given by participants gave eight core themes. Figure 2 shows five themes with the highest percentage coverage for each group.

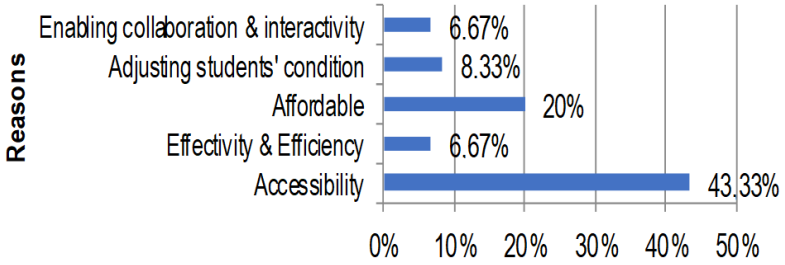

Figure 2. The five topmost reasons for choosing an online learning platform

Table 1. Participants' responses on reason of e-learning platform preference

Themes	Excerpts from participants responses
Acessibility	Easier and less distracted
	Easy to use and free
Effectivity & Efficiency	The explanation is clearer because students can see our expressions
	Effective and efficient
Comprehensive online learning features	Features support learning process
	Quiz facilities are easy to navigate, grades can be viewed and recorded in excel form, assignments are connected to e-mail, able to attach all assignments from all learning sources
Affordable	More quota friendly and commonly used
	Cheaper cost
Adjusting students' condition	In accordance with the ability of students' access to where they live (mostly in remote areas)
	To anticipate students whose house do not always have a good internet network
Enabling collaboration & interactivity	Facilitate interaction
	Makes 2-way communication easy
	Enables collaboration, easy to use and free
Controlling Aspect	To know students' attendance and readiness
	To find out which students are present at the online lecture
Personal & Institutional Preference	As recommended by university leaders
	The platforms are very popular among students and educators

As illustrated in Figure 2, accessibility and affordability are the most common reason for the choice of an online learning platform. Another three reasons chosen by participant are enabling collaboration and interactivity; adjusting students' condition; and effectivity & efficiency. The results of the questionnaire also indicate that WhatsApp Group is an online learning platform considered to have the easiest access. Some excerpts from participants' responses regarding the reasons for choosing the platform are presented in Table 1. The participants put forward several reasons regarding the selecting online learning platforms: ease of access, effectiveness and efficiency, affordability, suitability for students' conditions and the platform already offered by faculty. An easily accessible and affordable platform is considered to solve internet quota problems and poor internet signals in online learning, especially in universities with minimal facilities and budgets. WhatsApp has become a popular platform for online learning, which is considered an accessible and affordable platform. WhatsApp can preserve files for later use, accommodate collaborative learning and can be accessed anytime (Aduba & Mayowa-Adebara, 2021).

The advantages of the platform for online learning related to effectiveness, efficiency, and facilities provided are the solution to controlling and delivering material constraints. Google Classroom is considered an effective platform (Gupta & Pathania, 2021) and has many features that make it easier to use (Kumar et al., 2020). Meanwhile, Zoom Meeting, which provides virtual face-to-face facilities, makes it easier for educators to control learning. Zoom has several features that can help in communicative learning, including polls, breakout rooms, and video as well as screen sharing (Kohnke & Moorhouse, 2020). Zoom also features a recording option that might help students to repeat content that they haven't fully grasped (Minhas et al., 2021).

Table 2. Participant's responses on obstacle encountered in using e-learning platforms

Themes	Excerpts from participants responses
Limited network	Limited network in students' home
	Network constraint in students' place
Lack of Internet Quota	Students' limited internet quota
	Expensive internet provider quota
Unstable network	Complaints of unstable signal
	Poor connection
Power Outages	Internet network lost due to power outages
Controlling Aspects	Unable to control the students
Schedulling Aspects	Set the schedule to do online lectures while taking care of children
	Difficult to set the suitable time to ft students' schedule
Assessment	The process of correction and evaluation becomes more difficult
	Difficult to assess affective, psychomotor and hands-on activities
Plagiarism	Students relatively relied on googling as well as copy and paste their friends' answer
Difficulties in deliver materials	Difficult to explain about specific material due to not in face-to-face learning process
	Difficult to conduct practicum-based course
	Module preparation is more time consuming and intensive than the preparation and implementation of offline classes
Technical problem	There are still many students who don't understand how to use certain platform
	Data corrupt (case on Edmodo)
	Server down due to the user is overload
Adaptation issue	Students' adjustments to the use of e-learning platform are still not optimal
Lack of Students' Comprehension	Students' comprehension is lacking
Nature condition	Unfriendly nature condition and heavy rain
Never happened	Never happened

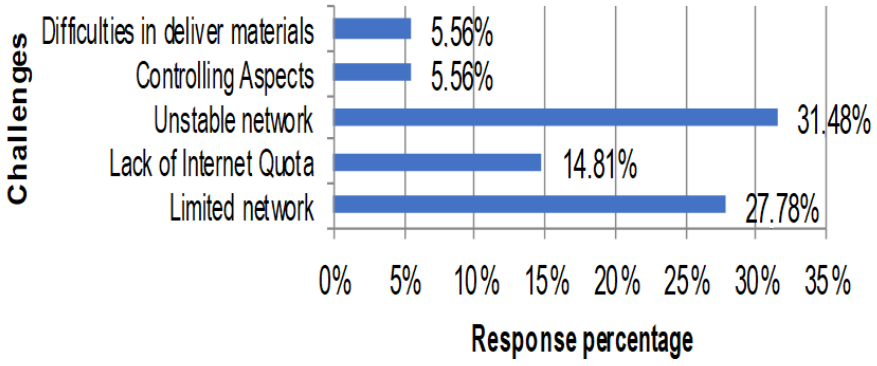

Figure 3. The five topmost challenges in using e-learning platform during pandemic

Analysis of participants' responses on the obstacle encountered during the use of e-learning platform during the COVID-19 pandemic yielded 14 themes (Table 2) and the five topmost obstacles can be seen on Figure 3. Most of the obstacle reported by the participants centered on internet network as a means of using the platforms during online learning. It can be seen in Figure 3 that unstable network is the biggest obstacle to the use of platforms in online learning (31.48%), which is followed by lack of internet quota, unstable network, controlling aspects, and difficulties in deliver materials.

According to the study's findings, the most significant challenge faced by biology and biology education lecturers during online learning is an internet network problem related to the network's level of stability and restrictions. This findings reflected previous studies by Xie et al. (2020), Aduba and Mayowa-Adebara, (2020) and Adnan and Anwar (2020). They reported that internet network is a critical component and must be prioritized for online learning success. In addition to computers and mobile phones, an internet network necessary for online learning (Xie et al., 2020).

A good internet network is essential in online learning since a faulty internet network can prevent access and impede learning (Adedoyin & Soykan, 2020). Dhawan (2020) added that if the internet network is not functioning correctly, it will most likely result in additional issues such as difficulties in downloading materials, installing learning software, logging into online learning platforms, audio and video instability, etc. Having a good internet network is need to be considered so that education gaps do not occur, as reported by Verma et al (2020) in Australia, where the educational gap is widening due to students' homes in remote areas.

The next obstacle encountered during online learning is the internet quota. This obstacle is a common obstacle in developing countries, as not everyone has a significant income; hence, internet quotas are not always available. According to Muthuprasad et al. (2021), as a developing country, India faces the most significant challenge in the form of limited quotas in the implementation of online learning. Participants of Aduba and Mayowa-Adebara's (2020) study also believe that the most significant barrier to online learning was the high cost of purchasing internet data, which impacted internet quotas to complete all required lectures. Several crucial aspects of lectures are affected by the limited quota constraint, such as updating content, posting assignments, downloading materials, collaborating in sharing document, and so on (Octaberlina & Muslimin, 2020).

Another challenge in online learning was the difficulty in transferring learning materials. The difficulties in transferring learning materials were classified as follows: (1) difficulties in explaining certain materials because they were not face-to-face with students; (2) difficulty doing practical activities; and (3) preparation takes more time and effort than offline classes. Those challenges is in accordance to Humphrey and Wiles (2021) who reported that almost all students prefer face-to-face learning over online learning because it is easier to engage and learn material content. It is easier to conduct discussions and ask questions directly and quickly, especially for biology students who are accustomed to laboratory activities but lack hands-on activities experience.

The last issue is the lecturer's inability to control students in online learning. This condition leads to several consequences, one of which is a decrease in students' motivation to apply what they have learned. Adnan and Anwar (2020) argued that students' learning motivation decreases in online lectures since they are unable to actively participate and engage directly with lecturers. Participants were asked to give suggestion on how to improve the using of e-learning platforms and online learning in the future. Participants' suggestion was grouped into 10 major themes as presented in Table 3. The five topmost suggestions from participants can be seen in Figure 4. As can be seen in Figure 4, providing internet quota assistance was ranked highest with 27.27% frequency. Participants also commented on the need to improve infrastructure and network as ways to make online learning better. Moreover, participants also made mention of the need for planning a comprehensive and careful learning design to facilitate all kinds of condition occurred during online learning. Besides that, e-learning platform introduction and habituation and the development of new platform is needed to better improve the online learning in the future.

Suggestions given by educators as implementers of online learning during the pandemic to solve problems that arise include providing a free quota for educators and students and improving infrastructure related to stable internet network procurement. Students' various economic circumstances must be considered in online learning because it is linked to their ability to provide digital devices and internet data (Dhawan, 2020). Government can form cooperation with related parties. Some of the efforts made by the government include providing free quota to lecturers and students, as well as providing internet for houses. Other suggestions are related to technological and internet infrastructure advancement. The prior disaster demonstrated the institution's ability to conduct online learning due to the availability of qualified technology.

Therefore, one of the requirements for supporting online learning during a disaster is adequate technology infrastructure (Ayebi-Arthur, 2017).

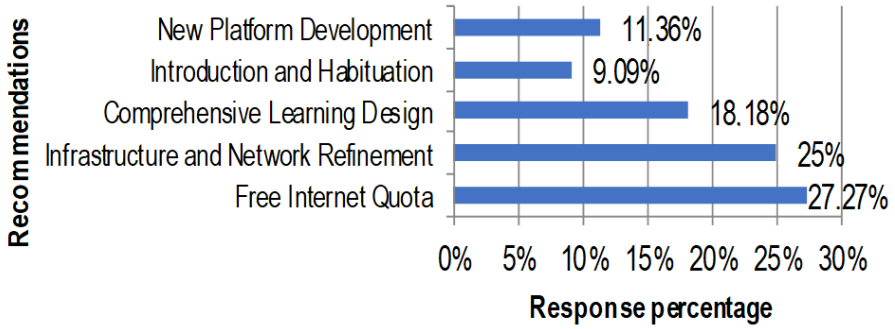

Figure 4. The five topmost participants on how to improve online learning in the future

Table 3. Participant's responses on obstacle encountered in using e-learning platforms

Themes	Excerpts from participants responses
Free Internet Quota	Providing free internet quota for lecturers and students
	Free access e-learning
	Free access google classroom
Infrastructure and Network Refinement	Improve internet access to make it stable
	Expand the internet network to the remote areas (rural areas)
Comprehensive Learning Design	Design the more accessible, cost effective and interactive learning
	Task variation
	Synchronous and asynchronous portion settings equally
Privacy enhancement	Improve security features as well as other features such as uploading tasks at zoom
Introduction and habituation	It's a need to familiarize with e-learning facility to make learning process more easy
	Get training for other platforms that have not been used
Students' awareness	The level of student discipline must be improved and preparation for finding places with good signals during online lectures
New platform development	It is necessary to develop a platform for practicum-based courses so that students can do practicum virtually
	Develop real-time attendance platform
Continuous Evaluation	The campus needs to evaluate the effectiveness of online lectures, especially regarding the limited quota
Determining standard platform	Making google classroom as the most basic and standard mandatory online media for all levels of education
Face-to-face learning preference	Online learning is only a complement and a means of helping (blended) learning and still prioritizes face-to-face lectures

Pandemic conditions forces universities to change learning methods from face-to-face to online in the middle of academic year. This transition was quite surprising for both educators and students, so there was not enough preparation for the implementation of online learning. Educators who are not ready for this change can only give assignments without paying attention to the essence of education. More careful and comprehensive learning design was another suggestion given by participants. Online learning requires at least six months of planning before being implemented. Before engaging in online learning, teachers can establish several strategies as a backup (Dhawan, 2020).

Nowadays, there are many online learning platforms available for free, but this has not been followed by the ability of educator to use them. The introduction and habituation of using online learning platforms are one of the suggestions given by educators regarding this problem. Educators also provide suggestions in developing a new platform that is able to accommodate all the expected features. Adjustment of learning to students' needs is needed in the current pandemic conditions (Schneider & Meirovich, 2020). We need to focus on employing low-cost technology that may efficiently aid learning (Dhawan, 2020). Several challenges also require institutional attention to design online learning policies that include resources and training (Adnan & Anwar, 2020; Mpungose, 2021).

Albeit the valuable insights gained from this study, it is only in lecturers' point of view regarding the utilization of e-learning platform during COVID-19 pandemic. Further research needs to be done to explore the students' side so that the lecturers can conduct online learning fitted to the students' condition. Furthermore, since the study was performed only in one context (biology education) which cover some regions in Indonesia with limited participants, further research needs to be done in national wide scale which

explore overall implementation of online learning to analyze the success and inadequacy in the practice of online education in Indonesian universities.

CONCLUSION

This study conducted when most Indonesian universities were locked down and all teaching took place in online mode. There are various kinds of online learning platforms that are used for home education during the COVID-19 pandemic. WhatsApp, Google Classroom and Zoom are the most used e-learning platforms by biology education faculty members because of its accessibility and affordability as well as the convenience of controlling aspects. The transition from a face-to-face setting to an entirely online has not been easy mostly due to the limited network, unstable network, internet quota limitation and controlling aspects.

Online learning during and post-pandemic need to be further improved with the help of universities and government as well as the lecturer themselves. Universities, government and private sector (i.e. provider platform) are expected to provide free internet quota for students and lecturer as well as make an improvement of infrastructure and network so it can be accessed throughout Indonesia even in rural area. For lecturer, they are expected to conduct range of innovative practices, which balance both synchronous and asynchronous learning. A limitation of this research, albeit the valuable insights gained from this study, is that it was performed in a single environment (biology education). Consequently, it is not possible to explicitly transmit or adapt the findings of the research to other context (i.e., generalizability of the research). Further research needs to be done in national wide scale which explore overall implementation of online learning to analyze the success and inadequacy in the practice of online education in Indonesian universities.

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