Learning assessment model in biology education during the COVID-19 pandemic

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Abstract: The COVID-19 Pandemic has resulted the change in every sector of life. Education institutions transform their learning methods from face-to-face learning to online-based distance learning to keep the learning process running during the pandemic era. The purpose of this study is to obtain the description and analysis results regarding learning profile and evaluation system used in the lecture at Biology Education Study Program during the Pandemic. This survey study was conducted in August 2020 until August 2021, even semester of 2019/2020, odd semester of 2019/2020, even semester of 2020/2021, and odd semester of 2021/2022. The population of this study was the students of Biology Education of UMM and the students of private universities in Malang City. Purposive sampling was employed for sample selection. The instruments used were survey and questionnaire forms. The data was analyzed descriptively and quantitatively. The results of the study show that online learning is apparently not optimal in Biology Education and other private universities in Malang due to limitations in discussions, assignments, and assessments. Therefore, it is necessary to conduct training session, planning, and implementation of innovative online learning to optimize learning process. To make the learning process more accurate and effective, evaluations are also needed.

Keywords: assignment; evaluation; online learning; online lecture model; types of assessment

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Introduction

The COVID-19 has been a popular issue nowadays. Since March 2020, WHO has stipulated the COVID-19 as a global pandemic as the number of people is infected (Cucinotta & Vanelli, 2020). The COVID-19 Pandemic situation has encouraged many countries to implement several health policies, such as physical distancing, work from home, and lockdown status to prevent the spread of the COVID-19 virus (Chu et al., 2020; Kramer & Kramer, 2020). The implementation of those policies has affected various sectors of life, such as economy and education (Daniel, 2020; Sparrow et al., 2020; Susilawati et al., 2020).

The closure of various learning institutions will bring up a variety of negative impacts to the community and the country. To keep learning process running well during the pandemic era, education institutions transform their learning methods from face-to-face learning to online-based distance learning (Adedoyin & Soykan, 2020; Basilaia & Kvavadze, 2020). The implementation of online learning is perceived as an alternative for any education institutions (Dhawan, 2020). Also, it may encourage the empowerment of 21st century skills (Clark et al., 2010). Furthermore, this era demands digitalization in education so that learning should indeed combine face-to-face learning with online learning (Barabanova et al., 2019; Schmidt & Tang, 2020; Shatunova et al., 2021).

However, online learning causes new problems in education world. The main problem, which frequently

reported, is lack of internet access. This includes the slow internet network, the high cost of the internet, and the limited role of parents in providing online learning facilities (Aguilera-Hermida, 2020; Ferri et al., 2020). In some other countries, many students cannot attend online learning because they do not have a supportive device (Yusuf, 2020). As a result, online learning can affect students' motivation. If the learning motivation is low, the quality of learning is also low (Alyusfitri, 2020). The low motivation and participation of students in online learning become challenges found in various studies.

In Indonesia, especially, online learning turns into a great challenge. It is because there are many areas with low internet access and inadequate facilities (Azhari & Fajri, 2021; Octaberlina & Muslimin, 2020). Moreover, many parents are also unable to provide internet quota for their children. Economy issue also causes many families cannot buy internet quota for online learning (Rahmawati & Sujono, 2021). This condition is compounded by the less prepared educators in using various online learning platforms. In fact, they are still not familiar with technology devices, such as computer and smartphone (Churiyah et al., 2020; Putri et al., 2020). Therefore, the learning design and policy formulation becomes a great challenge for education institutions in optimizing the quality of education.

Apart from the challenges in implementing online learning, several education institutions in Indonesia have provided Learning Management System (LMS) to facilitate lecturers in designing learning, including at the University of Muhammadiyah Malang (UMM) and private universities in Malang City. In UMM, ELMU has been provided and developed by the campus which is a Canvas-based LMS. In some ways, the lecturers may use other learning platforms based on their needs. Based on initial observation in Biology Education study program at UMM, several lecturers utilize online platforms, such as Zoom, Google Meet, Google Classroom, Edmodo, YouTube, and WhatsApp. In addition, there are at least 12 free applications in Indonesia that can be used as online learning media during the COVID-19 pandemic, namely Home learning, Our table, Icando, Indonesia X, Google for Education, Smart Class, Microsoft Office 365, Quipper School, Ruang guru, Your School, Zenius and Cisco Webex. However, the percentage of media usage is still unidentified.

Regarding learning in the COVID-19 pandemic era, various studies were carried out by researchers to examine online learning. Some studies have identified the problem in online learning (Churiyah et al., 2020; Rahmawati & Sujono, 2021). Some studies discuss about responses from various parties, such as teachers and students, toward online learning (Bączek et al., 2021; Rahayu & Wirza, 2020). Other researchers have discussed about students' readiness to participate in online learning and the effect of teacher competencies toward online learning (Hindun et al., 2021; Martha et al., 2021). Based on those studies, the researcher would like to map the use of online platform, learning methods, assignment, and evaluation in online lecture in the education institutions with LMS facility. Therefore, the purpose of this study is to discuss about learning and system models in UMM Biology Education Study Program and other private universities in Malang City. This study elaborates the description about how the educators adapt, create, and design online learning even though the institutions have already provided a platform that can be used.

Method

This study applied survey analysis which aimed to obtain the description and analysis results regarding learning profile and evaluation system used in Biology Education Study Program at UMM and other private universities in Malang City. The survey method was categorized as Longitudinal Survey since it was used to understand learning in the beginning and during the COVID-19 pandemic. The survey consisted of two parts; the first survey was intended to get initial data of the general description of learning and the second survey was intended to identify the assessment systems. The description of the survey results was used to make further learning plans and policies. The survey was conducted to obtain the opinion, attitude, and expectation of students in revealing the facts and the effects of likes or dislikes. In addition, Cross Sectional Survey was used to compare learning and evaluation systems in UMM and other universities.

The study was conducted in August 2020 until February 2022 at Universitas Muhammadiyah Malang, IKIP Budi Utomo, and Universitas Tribuana Tunggadewi Malang. IKIP Budi Utomo was selected because as a private university, its Biology Education study program has been accredited B. Further, the Biology Education study program of Universitas Tribuana Tunggadewi has also been accredited C. The study was conducted for 4 semesters, namely in the even semester of 2019/2020, odd semester of 2019/2020, even semester of 2020/2021, and odd semester of 2021/2022.

The population of this study was the students of Biology Education of Universitas Muhammadiyah Malang (UMM) and Private Universities (PTS) in Malang City. The technique of selecting the sample was purposive sampling which aimed to obtain the description and analysis results regarding learning profile and evaluation system used in Biology Education Study Program of UMM and other PTS in Malang City. The minimum number of samples expected to be involved in this study were 36 students of UMM with the basis calculation of 4 times the average number of students in every 30 percent and a minimum limit of 30 percent of (4 x 30) so that the number was at least 36. Meanwhile, the number of

respondents from PTS was a minimum of 27 respondents with the basis calculation of 3 x PT x 30 respondents x 30 percent was 27 respondents. The details of overall respondents are showed in the Table 1.

Table 1. Respondents of the research

Semester	University	Total
Even Semester of 2019/2020	Universitas Muhammadiyah Malang (UMM)	195
Odd Semester of 2019/2020	Universitas Muhammadiyah Malang (UMM)	201
Even Semester of 2020/2021	Universitas Muhammadiyah Malang (UMM)	125
Even Semester of 2020/2021	IKIP Budi Utomo	125
Odd Semester of 2021/2022	Universitas Tribuana Tunggadewi	44

The data were collected by using questionnaire in the form of Google form distributed to the respondents. The questionnaire consisted of six items to measure six aspects, namely online learning, online learning model, online learning method, types of assignment, discussion, and assessment. The instruments were developed by the researcher and validated by the expert team. After developing the instruments, they were distributed to the respondents through WhatsApp group. The questionnaire was used to find out respondents' opinion about learning and evaluation system during the COVID-19 Pandemic. After collecting the data, the data was analyzed descriptively-quantitatively in the form of bar diagram.

Results and Discussion

Since March 2020, all lectures and learning process in UMM have been conducted online. This is in accordance with the appeal of the Minister of Education and Culture of the Republic of Indonesia through a Circular Letter Number 4 of 2020 concerning the Implementation of Education Policy in the Emergency Period of Corona Virus Disease (COVID-19). The following describes the online lecture system at the Biology Education Study Program of UMM, IKIP Budi Utomo, and Universitas Tribuana Tunggadewi Malang in terms of various aspects of learning.

Types of platforms used in online lectures

Teachers can carry out joint learning at the same time using groups on social media such as WhatsApp, Zoom Cloud Meeting, Google Meet, or other media. The type of platforms used in online lectures at Biology Education Study Program of UMM, IKIP Budi Utomo, and Universitas Tribuana Tunggadewi Malang are presented in Figure 1. At the beginning of the Pandemic era or even semester of 2020/2021, it can be seen in Figure 1 that the applications frequently used in online lectures were Google Meet, Zoom Meeting, Google Classroom, WhatsApp, YouTube, and Edmodo, while e-mail and Instagram story were rarely used. In the odd semester of 2020/2021, Zoom Meeting, Google Meet, Google Classroom, WhatsApp, YouTube, and Edmodo were frequently used in lecture activities, while Instagram Story was rarely used. In the even semester of 2021/2022, Zoom Meeting, WhatsApp, Google Meet, and YouTube were frequently used in online lectures. Meanwhile, Canvas, Edmodo, Email, Instagram Story, and Telegram were used with the least percentage. In the odd semester of 2021/2022, Zoom, Google Meet, Google Classroom, and WhatsApp occupied the position with the highest usage percentage. On the other hand, Telegram occupied the position with the lowest usage percentage.

According to Figure 1, it can be identified that at the beginning of pandemic era (even semester), there were three platforms with the highest usage percentage, namely Zoom Meeting, Google Meet, and WhatsApp. The use of applications in online learning generally always considers several things, one of which is to ease the access to the application without imposing students (Rahman & Leman, 2021). Survey in four semesters has showed that Zoom Meeting and Google Meet are two video conference-based platforms with the highest usage percentage. Zoom and Google Meet may provide a form of lecture that is most similar to face-to-face lectures in class. In fact, lecturers and students can meet virtually so that discussions, question and answer sessions, presentations, and other lecture activities can be done (Joia & Lorenzo, 2021; Putri et al., 2020). Those methods are common during face-to-face learning in the class. The findings indicate that the lecturers are more comfortable in designing online lectures that have similar methods as their offline lectures.

Zoom is the most used platforms for online learning in the COVID-19 Pandemic period, according to research conducted in another country, such as Hong Kong (Kohnke & Moorhouse, 2020) and United State (Serembus & Kemery, 2020). Zoom is an online learning platform that is very accessible because it can be downloaded for free by all users. By using Zoom Meeting, educators and students can communicate more effectively because everyone can see and hear each other's conversation during the learning process (Guzacheva, 2020). Through this platform, teachers can schedule learning activities through the Schedule menu. Zoom Cloud Meeting can be used on Android, Windows, iOS, and Mac systems and the virtual background of the users can be customized. Zoom can also record and save

videos of the learning activities without an assistance from third software (Archibald et al., 2019).
Another finding that needs to be concerned is the lack of optimal use of Learning Management System (LMS) by lecturers at the beginning of the pandemic. There are only 28 percent of lecturers using LMS, 15 percent using Google Classroom, and 13 percent using Edmodo. Actually, online learning can be optimized by utilizing the LMS. LMS is a software application devoted to the needs in online teaching and learning activities, such as administration, documentation, materials, discussion, evaluation, and reports of a teaching and learning process (Juhary, 2014). The use of LMS can optimize and enable electronic teaching and learning processes (Cavus, 2015). These findings indicate that the lecturers are not ready or have not used the LMS in the learning process even though the they had attended training on using canvas of UMM/ELMU. Whereas, the presence of ELMU is expected to facilitate the lecturers in designing neater and measurable online lectures.
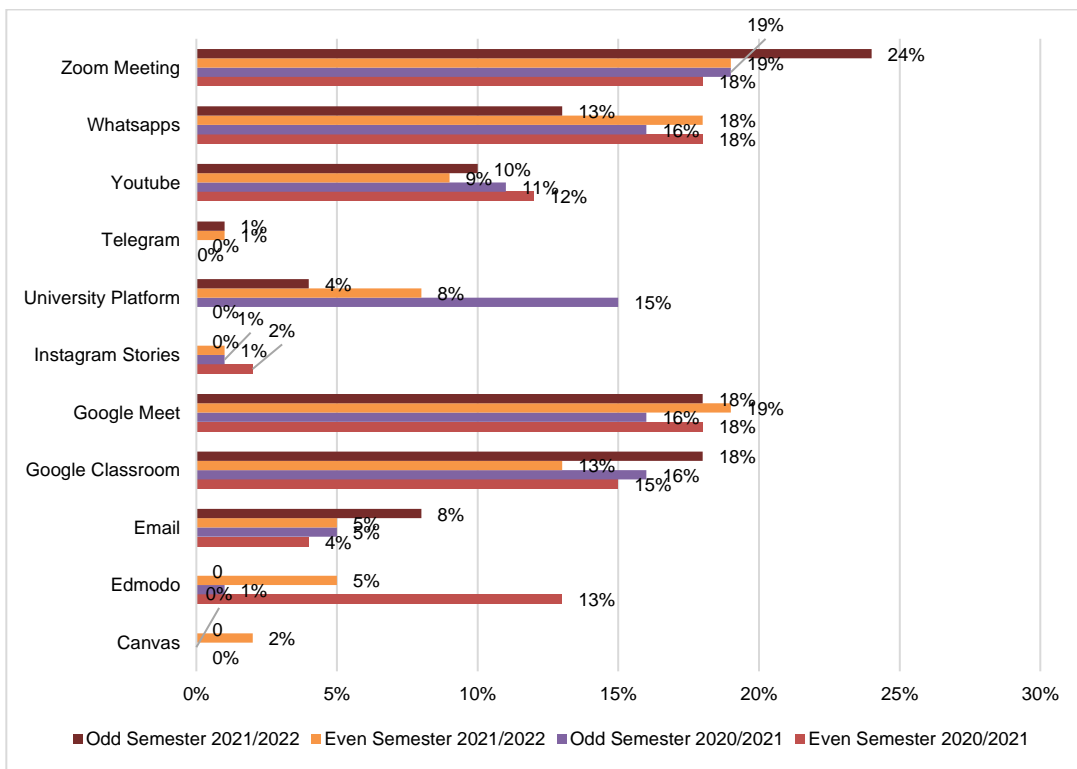

Figure 1. Types of platforms used by lecturers

Lectures method during online lecturers

Learning method is a way carried out by educators in delivering material to students with the purpose of helping and making the teaching and learning process easier. There are various learning methods that can be used by educators to support learning activities in the class. As described in Figure 2, there are lecture methods applied by the lecturers of Biology Education Study Program of UMM, IKIP Budi Utomo, and Universitas Tribuana Tunggadewi Malang. Figure 2 shows learning methods employed by lecturers of Biology Education Study Program of UMM. The learning method with the highest percentage in the even semester of 2020/2021 was question and answer method with a percentage of 43 percent, followed by talk with a percentage of 42 percent, and PjBL (Project-Based Learning) with a percentage of 15 percent. Meanwhile, in the odd semester of 2020/2021, learning method with the highest percentage was question-answer method with a percentage of 36 percent, followed by talk with a percentage of 27 percent, PjBL with a percentage of 19 percent, and PBL (Problem-Based Learning) with a percentage of 18 percent. In the even semester of 2021/2022, learning method with the highest percentage was question-answer method with a percentage of 35 percent, followed by talk with a percentage of 24 percent, PjBL with a percentage of 23 percent, and PBL with a percentage of 18 percent. In the odd of semester 2020/2021, learning method with the highest percentage was question and answer method with a percentage of 49 percent and followed by talk with a percentage of 26 percent.

The discussion method delivers teaching materials where students are faced with a problem to be discussed and solved together. By using this method, the creativity of students can be improved, in addition, they are accustomed to appreciate other people's opinions. However, the discussion method has several weaknesses, such as talks that sometimes deviate so long (Widayati, 2004). On the other

hand, the question-answer method is the learning method by presenting lessons in the form of questions that must be answered, especially from teachers to students. Question-answer method can train students to express opinions in the discussion so that the learning conditions can be fun and eventually improve students' motivation and learning outcomes (Sitohang, 2017). However, the question-answer method also has weaknesses as it is not easy to make questions that fit to the level of thinking of the students and the amount of time wasted, especially if students cannot answer the questions.
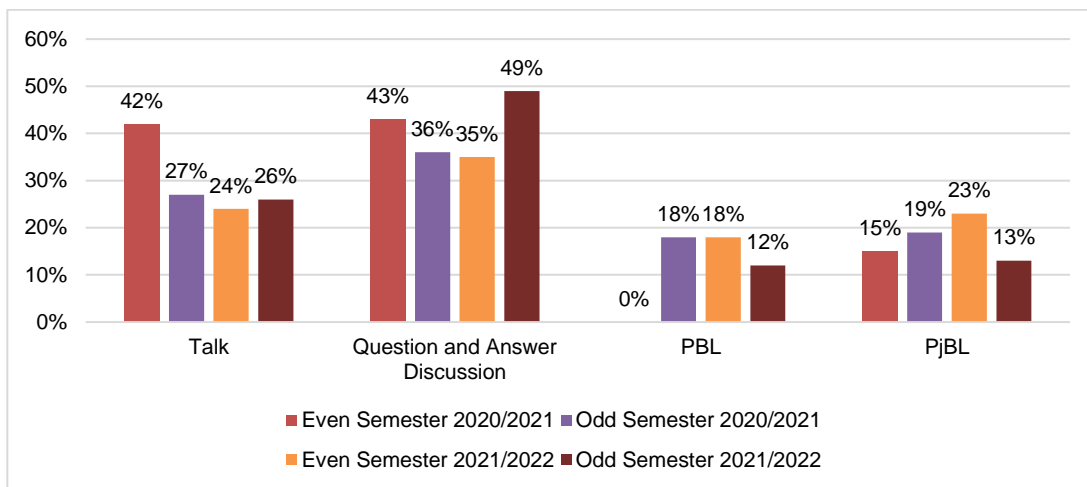

Figure 2. Types of learning methods used by lecturers in online class

In addition to the question-answer methods, it turns out that some lecturers have also implemented innovative learning models, such as Project-Based Learning (PjBL) and Problem-Based Learning (PBL). Based on various previous studies, these two learning models were indeed recommended for both face-to-face learning and online learning (Albanese & Dast, 2013; Kokotsaki et al., 2016; Yew & Goh, 2016). Some studies also informed that the design of hybrid-PJBL learning can empower the important skills of students (Rahardjanto et al., 2019; Tong et al., 2020). Some of these skills can also be empowered optimally through the application of hybrid-PBL.

Types of assignment during online

Assignment is one of educator's efforts so that students can repeat the material that has been taught outside the study hours and as one of the means to achieve learning goals. This is also applied in the lecturer of Biology Education Study Program of UMM, IKIP Budi Utomo, and Universitas Tribuana Tunggadewi Malang during online learning in which students learn from the lecturer as described in Figure 3. According to Figure 3, in the even semester of 2020/2021, the types of assignment that occupied positions with a high percentage were question-answer with a percentage of 26 percent, paper making with a percentage of 24 percent, resume making with a percentage of 23 percent, and article analysis with a percentage of 23 percent. In the odd semester of 2020/2021, the types of assignment that occupied positions with a quite high percentage were article analysis with a percentage of 27 percent, question-answer with a percentage of 25 percent, resume making with a percentage of 22 percent, and paper making with a percentage of 23 percent. Meanwhile, in the even semester of 2021/2022, the types of assignment with a high percentage were paper making with a percentage of 18 percent, PPT making with a percentage of 18 percent, question-answer with a percentage of 16 percent, and article analysis with a percentage of 15 percent. Furthermore, in the odd semester of 2021/2022, the types of assignment with the highest percentage were video making with a percentage of 20 percent and question-answer with a percentage of 19 percent.

Based on the findings, it can be seen that some of assignments provided by the majority lecturers have encouraged students to develop 4C, especially on the article analysis. Through these assignments, students are required to be able to understand the contents of the article before they can do further analysis. When delivering the results of the analysis, their communication skills will also be trained because they are forced to be able to translate information in articles using their own language. In addition, by reading scientific articles, students will understand the development of research in the field of Biology and Education and learn how to conduct research in these two fields.

Apart from article analysis, resume and paper making also become common assignments given by lecturers. By giving resume and paper making, students are expected to be motivated to read lecture materials. Through this kind of activities, they will be encouraged to learn independently, both before and after attending online classes. The existence of reading activities can increase their reading interest and

cultural literacy. The high interest in reading is the main basic to improve other students' competencies (Wigfield et al., 2016). The high literacy will also prevent them from misinformation that are widely scattered in the COVID-19 pandemic era (De Paor & Heravi, 2020; Sharon & Baram-Tsabari, 2020).
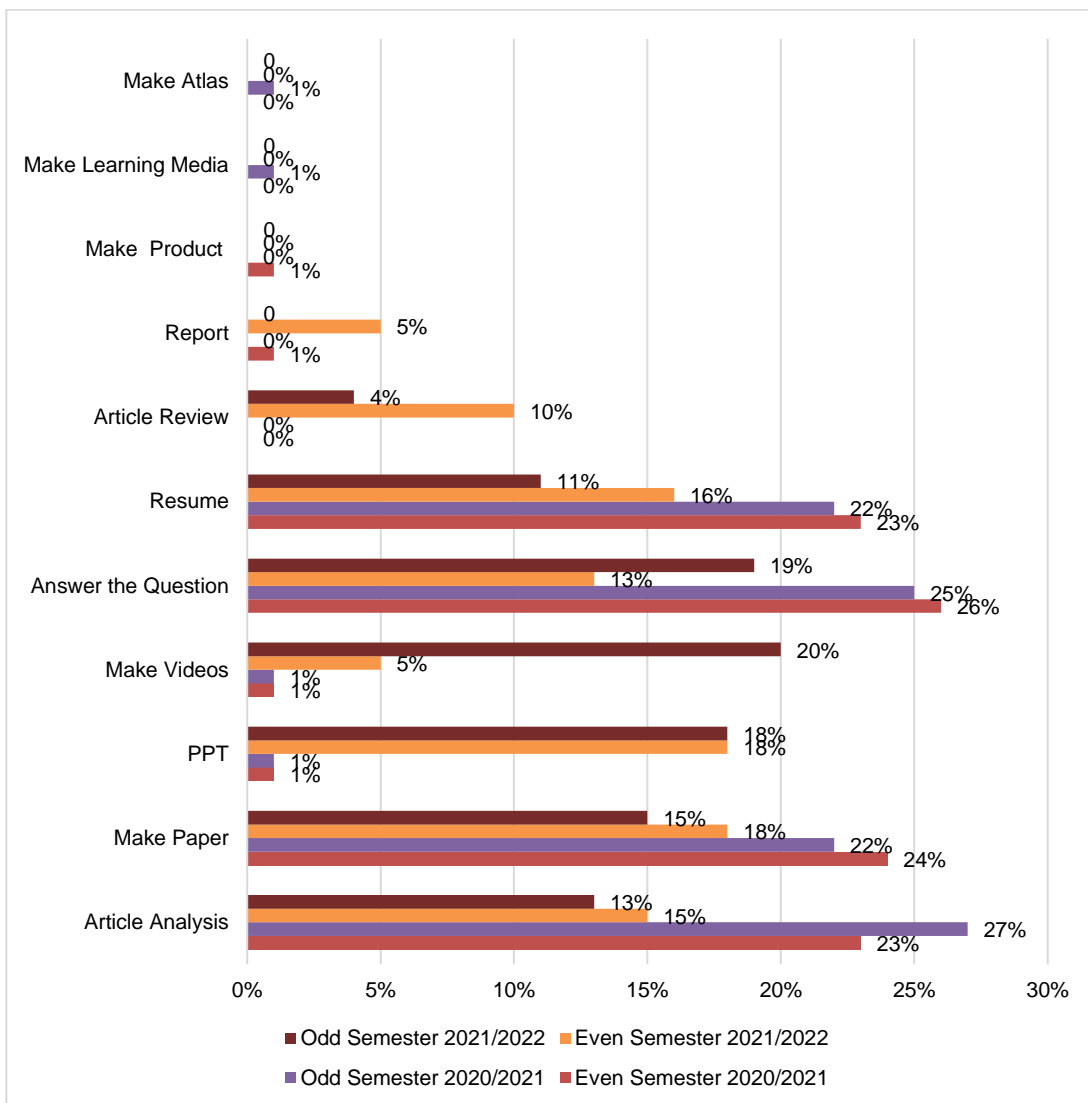

Figure *3*. Types of assignments during online lectures

Types of assessment used by lecturers

Learning assessment is an instrument to find out the level of success of students, but assessment is not the only key indicator in learning. Assessment is a challenge in online learning, especially when lecturers want to evaluate the affective and psychomotor aspects of students. This difficulty is in line with the findings of several previous studies. In fact, online learning limits lecturers to observe students' attitudes during learning process. In addition, online learning also limits the lecturers to design learning that empowered psychomotor as found in face-to-face class. In this regard, in the field of Biology, students are unable to access laboratories and obtain material tools for various practices. Unsurprisingly, lecturers will face difficulty to access or empower affective and psychomotor aspects of the students. However, the evaluation process and results of learning must be carried out by Biology Education lecturers during online learning. Therefore, various activities and assessments are carried out to realize this.

According to Figure 4, there are various kinds of assessment used by lecturers of Biology Education Study Program of UMM, IKIP Budi Utomo, and Universitas Tribuana Tunggadewi Malang. According to the survey results, assignment is generally in the form of paper making, resume making, analytical-critical journal making, PPT making, video-learning making, article review, article making, questions making, paper review. Punctuality in collecting assignments becomes a crucial aspect for lecturers since it describes discipline and responsibility of the students. Completion of assignment should be fit to the

standard points that have been determined by the lecturers. Beside participation and assignment, the evaluation of presentation discussion is one of assessments with a high percentage during three semesters. The characteristics of presentation discussion assessment are carried out by lecturers according to the students' needs. Before presentation discussion session, the lecturer divides the students into some groups. Each group is given different materials from other groups. The procedures of assessment cover the students' method in delivering the materials or topic. The delivery determines students' understanding on the topic. Thus, students are demanded to deeply understand the materials. Apart from the delivery method, students' competence in answering the questions also becomes the requirement of the assessment.
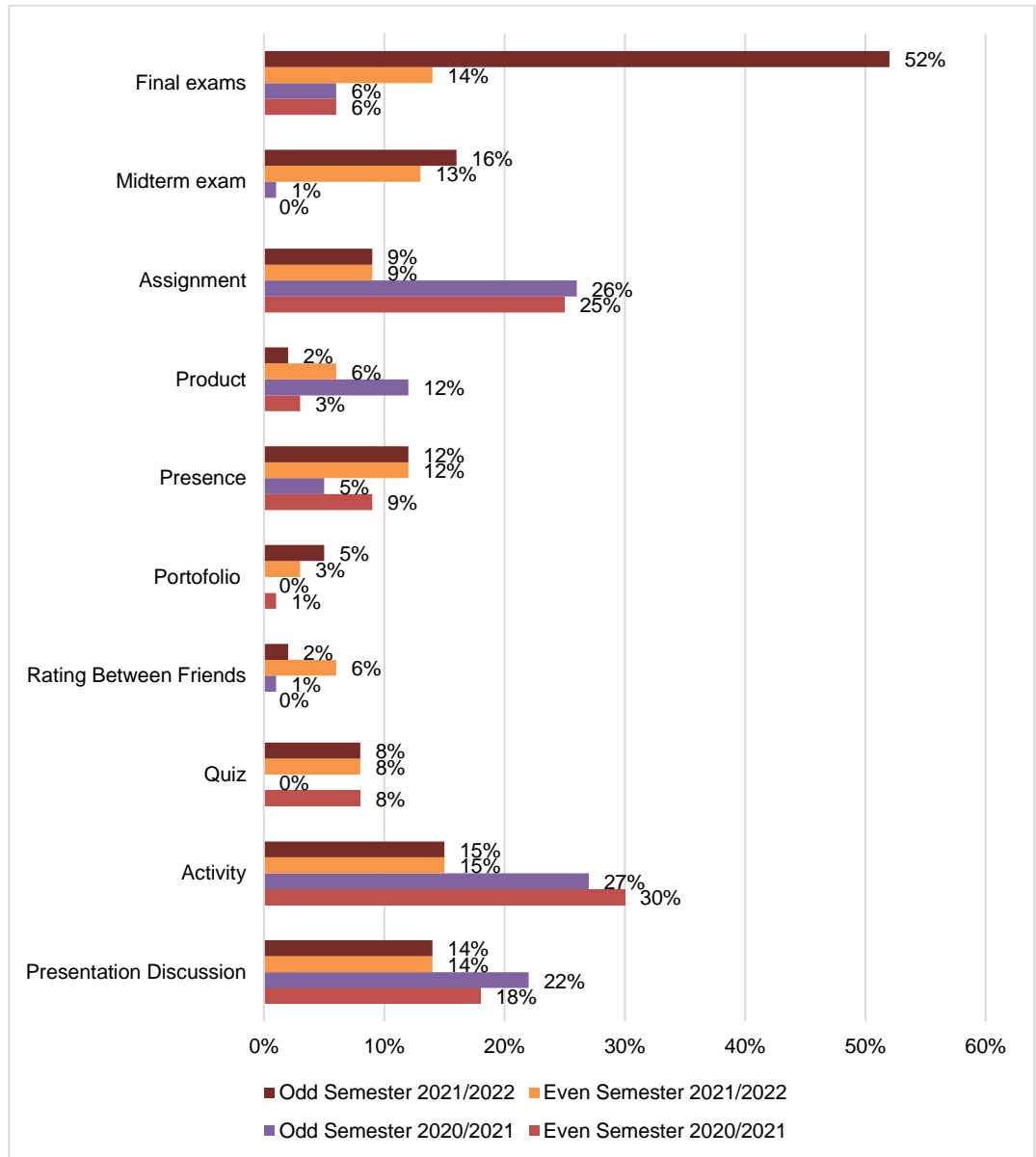

Figure 4. Types of assessments used by lecturers

An attempt to improve the quality of education can be seen from the quality of learning and its assessment system because the quality of learning can be reviewed from the results of its evaluation. Assessment is also a reflection of the quality of learning because the assessment design must be in line with the objectives and design of learning that has been implemented (Ramdiah et al., 2019). The types of assessments used generally vary depending on the agreement decided by the educators. Generally, the type of assessment will be used to deliver materials at the beginning of learning. On the other hand, evaluation activities include difficult challenges faced by teachers during online learning in the pandemic era (García-Peñalvo et al., 2021). Changes in the form of learning require teachers to change their

methods and evaluation tools (Sutarto et al., 2020). However, even though it is difficult, students must be evaluated continuously with various online assessment activities (García-Peñalvo et al., 2021).

Conclusion

The COVID-19 Pandemic causes some universities to transform their learning methods from offline to online. In Biology Education Study Program, video conference has the highest usage percentage during distance learning. Talk and question-answer become the most common choices used by the lecturers, even some of them have already implemented Project-Based Learning and Problem-Based Learning. Analytical-critical article making, paper making, and resume making are frequently given by the lecturers. In the assessment aspect, the lecturers frequently perform assessment through assignment, activity, and presentation discussion.

According to the survey analysis, online learning does not seem optimal in the Biology Education Study Program of UMM, IKIP Budi Utomo, and Universitas Tribuana Tunggadewi Malang. Some learning designs of talk, assignment, and learning evaluation have already empowered the 21st century skills, however, the usage percentage are still not satisfactory. Training, habituation, and implementation of innovative online learning require totality during the learning process. Moreover, the evaluation design is also needed so that the learning process can be more accurate and effective.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Author Contributions

Y. P.: methodology, T. N. I. S: analysis; Y. P. and T. N. I. S: writing original draft preparation, and Y. P., T. N. I. S., and M. N: review and editing.

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