Bioedusiana

Analisis Hasil Belajar Biologi Pada Jenjang Pendidikan SMA di Kota Bandar Lampung Selama Pembelajaran Daring

Analysis of Biology Learning Outcomes at Senior High School Level`s in the Bandar Lampung City During Online Learning

Dina Maulina[1], Ismi Rakhmawati [2], Arwin Surbakti [3], Darlen Sikumbang [4], Dwi Wahyudi[5]

[1,2,3,4] Pendidikan Biologi, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Lampung, Jl. Prof. Dr. Soemantri Brojonegoro No.1, Bandar Lampung, Lampung, Indonesia, 351415
[5] Master of Education in Digital Learning, Monash University, Wellington Rd, Clayton VIC 3800, Australia

Abstrak

Tujuan penelitian ini adalah untuk menganalisis hasil belajar biologi peserta didik terhadap capaian kompetensi dasar meteri biologi pada jenjang pendidikan SMA serta mengevaluasi keterlaksanaan pembelajaran biologi secara daring bagi guru dan peserta didik dalam rangka mencapai kompetensi yang diharapkan. Desain penelitian menggunakan deasain *ex post facto,* dengan populasi adalah seluruh peserta didik SMA Negeri di Kota Bandar Lampung pada sebaran lokasi kecamatan yang berbeda yang terwakili berdasarkan tingkat akreditasi sekolah yang setara. Sampel diambil dari populasi yang terdiri atas: SMA N 2 Bandar Lampung, SMA N 5 Bandar Lampung, dan SMA N 7 Bandar Lampung. Perolehan data kuantitatif berupa nilai hasil belajar pada materi pokok *plantae*, data kualitatif berupa analisis hasil angket yang di peruntukan bagi guru dan peserta didik. Wawancara dilakukan untuk memperoleh data sekunder berupa data deskriptif yang dilakukan melalui *teleconference*. Hasil uji menunjukkan bahwa terdapat perbedaan hasil belajar yang signifikan lebih baik pada kelas daring dibandingkan dengan kelas tatap muka (p<0,05). Aplikasi belajar daring yang dominan digunakan dengan menggunakan *google classroom* yang sudah berbasis *Learning Management System* (LMS). Sebanyak 74,1% peserta didik mengungkapkan bahwa pembelajaran daring membatasi interaksi dan komunikasi dengan teman dan guru terkait materi pelajaran. Dengan demikian, hasil penelitian ini membuktikan bahwa hasil belajar biologi peserta didik yang dilaksanakan secara daring berbasis LMS berpengaruh signifikan, akan tetapi interaksi, kolaborasi dan komunikasi antar peserta didik selama proses pembelajaran masih menjadi kendala.

Kata kunci: biologi; jenjang pendidikan SMA; pembelajaran daring.

Abstract

The purpose of this study was to analyze students' biology learning outcomes towards the achievement of basic competencies in biology materials at senior high school and to evaluate the implementation of online biology learning for teachers and students in order to achieve the expected competencies. The research design used an ex post facto design, with the population being all state senior high school students in the city of Bandar Lampung in a different distribution of sub-district locations represented based on the equivalent level of school accreditation. Samples were taken from a population consisting of: SMA N 2 Bandar Lampung, SMA N 5 Bandar Lampung, and SMA N 7 Bandar Lampung. The acquisition of quantitative data in the form of learning outcomes values on the subject matter of plantae, qualitative data in the form of analysis of the results of a questionnaire intended for teachers and students. Interviews were conducted to obtain secondary data in the form of descriptive data carried out by teleconference. The result showed that there was a significant difference in learning outcomes in online classes compared to face-to-face classes (p <0.05). The dominant online learning application used is using google classroom which is already based on the Learning Management System (LMS). As many as 74.1% of students stated that online learning limits interaction and communication with friends and teachers regarding subject matter. Therefore, the results of this study prove that the biology learning outcomes of students carried out online based on LMS have a significant effect, but the interaction, collaboration and communication between students during the learning process become an obstacle.

Keywords: *biology; senior high school level's; online learning.*

INTRODUCTION

The Government of the Republic of Indonesia policy regarding the Covid-19 pandemic requires learning activities to be carried out online or Study From Home (SFH) which refers to the regulation from the Minister of Education and Culture Number 36962/MPK.A/HK/2020. This policy applies to the implementation of online learning at every level of the education unit. This incidental enforcement has an impact on adequate technological readiness efforts in each education unit (Badan Litbang SDM Kemkominfo, 2013).

Technological readiness is a requirement and benchmark in the implementation of online learning (Kagermann, Wahlster, & Helbig, 2013). Learning using technology requires devices such as computers, gadgets, and internet access that must be available (Rose, 2007). The implementation of online learning requires the cooperation of teachers and students' parents to monitor learning activities. Even though high school level has consciously and able to use gadget and computer applications independently, it is still necessary to monitor and evaluate the completeness of their learning (National Academy of Engineering and National Research Council of The National Academic, 2006). How the wide and depth of the material following with the basic competency can be absorbed and achieved by all students (Maryland State Department of Education, 2005).

Specifically, learning biology needs verification, and validity in a field of scientific study can be done by obtaining contextual empirical data (Maulina, et.al., 2020). Therefore, observation is an alternative to understand, prove and reveal existing biological facts. Laboratory activities to prove science is real learning that can be adopted for the development of contextual learning in the classroom. However, government policies to implement laboratory-based learning, and observing nature through online learning are difficult to implement. Therefore, it is necessary to make alternative efforts to overcome this. Teachers are required to be able to design biology online learning by considering the achievements of each basic competency expected in the curriculum.

In particular, this study will examine the study of high school biology learning with basic competency 3.8 classifying plants into divisions based on their general characteristics and roles. The achievement of basic competence is material that requires real observation in the learning process. However, current conditions require learning to be carried out online. Therefore, it is necessary to measure the absorption of students against the basic competency achievements.

The implementation of online learning activities in Indonesia has been supported through facilities and cooperation between the government and the private sector, both in internet access and student learning applications. More than that, information and communication technology facilities and other social media applications such as learning houses, TV shows, Google Classroom, Edmodo, Google meetings, Zoom meetings, Jitsi, Webex, Hangout, Whatsapp

Group, Skype, and other video teleconferences will be a consideration for the teacher in online learning. Ideally, online learning activities require an LMS (Learning Management System). All learning activities are facilitated at the LMS starting from introduction, core, closing activities, assignments, and evaluation (Edi, 2011; Marcelina 2010).

Several aspects of assessment in online learning are also important, such as the appropriateness of the assessment with duration given, assignments, presentations, activeness, punctuality collecting assignments, quizzes, midterm exams, and final semester exams (Sung, 2017). Real online learning has become a solution in overcoming the problem of implementing physical distancing (Kohler, & Weisz, 2016). However, it is necessary to review how comprehensive learning activities are carried out in Indonesia. Technological literacy is required good, safe, and affordable alternative for high school students in the situation of the Covid-19 pandemic.

The city of Bandar Lampung is one of the areas designated as a red zone against the spread of Covid-19. Therefore, all level education units impose absolute determination of online learning. This situation implies intensive monitoring of safety, health, and education. To overcome this, the online learning activities of the Lampung provincial government have sought to have an independent learning domain that is still affiliated with the learning house by accessing the website http://smartschool.lampungprov.go.id. This effort hopefully can make learning easier for students. Thus, based on the description above, the researchers need to conduct a study of the implementation of biology online learning to determine the understanding of students through learning outcomes which can then be used as a basic reference for teachers in carrying out learning activities online.

METHOD

The research design used in this study was an ex-post-facto survey (Frankel & Wallen, 2011). The population is all SMA Negeri students in the city of Bandar Lampung with a distribution of different sub-district locations that are represented based on the equivalent level of school accreditation. Samples were taken from a population consisting of SMAN 2, SMAN 5, and SMAN 7 (Table 1) totaling 231 students. The number of samples in the experimental group amounted to 159 students and the control group as many as 72 students. The acquisition of quantitative data value of learning outcomes on the subject matter of Plantae was obtained through a written test in multiple-choice questions. Qualitative data are analysis results of a questionnaire taken through a questionnaire instrument distributed using google form which is intended for teachers and students. Interviews were conducted to obtain secondary data in the form of descriptive which was carried out by teleconference. Data on students' understanding ability is measured by conducting online tests through the google form application.

Plantae learning material in the control class was carried out before the implementation of online learning in February-March 2020 with the cooperative learning method through discussion. Online learning was carried out using the google classroom application and Whatsapp group which was held in June-July 2020. The survey was conducted by giving Plantae test questions to online and face-to-face groups, as well as a questionnaire on students' responses to online learning.

Table 1. Ex Post Facto Design

Control Class	Kelas Eksperimen	
X1 (SMAN 7)	X2 (SMAN 5)	X2 (SMAN 2)
Y1	Y2	

Note:

X1: Face-to-face learning with the Cooperative Learning model

X2: Online learning with Google Classroom LMS-based learning platforms

Y1: Biology learning outcomes in offline class

Y2: Results of studying biology in online classes

The research data consisted of quantitative and qualitative data. Quantitative data were obtained from the value of the learning outcomes of students in the Plantae material and student response questionnaires, while qualitative data were obtained from open questions to students regarding the effectiveness of online learning during the pandemic. Data on cognitive learning outcomes are test scores on the Plantae which is classifying plants into divisions based on their general characteristics and roles. The form of questions given is multiple choice questions totaling 25 items with 5 alternative answers with the criteria for testing the validity and reliability of the items carried out using ANATES (Arif, 2014).

Table 2. Category of Learning Outcomes Value

Score/Percentage	Category
80-100	Very Good
66-79	Good
56-65	Moderate
40-55	Low
30-39	Failed

Data on student learning outcomes on the Plantae material were analyzed on average and standard deviations were then categorized based on Table 2. Testing for normality and homogeneity of learning outcome data was carried out before the difference test using the Shapiro-Wilk SPSS program. If the value is Sig. > 0.05 (normally distributed). Furthermore, the data on student learning outcomes were tested for differences between online and offline classes

using the Mann Whitney test. If the signification is less than 0.05 means that there is a significant difference between online and offline classes.

RESULTS AND DISCUSSION

Results

The learning outcomes of students in the online learning classes carried out online had an average value of 81.03 (Table 3) which was greater than the average offline group learning outcomes (76.11) whose implementation of learning could still be carried out offline advance before the adoption of online learning. Online learning classes outcome has an excellent category while offline classes have a good category. This shows that online and offline learning can achieve learning outcomes above the minimum completeness criteria.

Table 3. Biology Learning Outcomes

Parameter	Group	
	Experiment	Control
Mean	83,67	76,11
Std. Deviation	18,02	9,83

The learning outcome data were then tested differently using SPSS with the Mann-Whitney non-parametric test. The results of different tests show that there are significant differences in learning outcomes in online classes compared to offline classes with Asymp. Sig. 0.000<0.05 (Table 4). This shows that learning Plantae material carried out online is better understood by students compared to offline classes which are usually carried out by the lecture and discussion method.

Table 4. Mann-Whitney Difference Test Results

Data	Asymp. Sig.	Mann-Whit.U	Result
Experiment and Control	0,000	0,4052	There is differences

Student responses to online learning during the pandemic were shared via a google form. Information was obtained that teachers used various applications that facilitate the implementation of online learning (Figure 1) with the most widely used application in google classroom. Based on data support through interviews, this application is easy to use by students and teachers by using Gmail, the teacher can create classes independently. Google classroom is one of the LMS platforms with completeness for uploading material, attendance, making topics, conducting exams, correcting assignments, and other features.
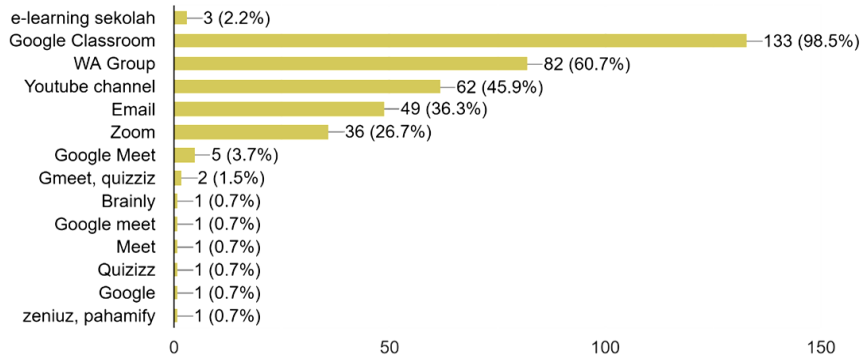
Figure 1. Learning Applications in Online Learning

The results of the research from the student response questionnaire data on online learning are seen in Table 5. Learning is still carried out by teachers and students during a pandemic through internet access or online as evidenced by the response of students as much as 99.3%. The teacher also keeps checking the attendance of students during online learning through the online attendance list using Whatsapp group or google sheet so that they can monitor the attendance of students. The implementation of online learning for the Plantae material from the results of the questionnaire data showed that 82.2% of students were effective, but the involvement of teachers in learning activities was only 40%.

Table 5. Student Responses in Online Learning

No	Questionnaire Variabel	Response (%)
1	Online learning implementation by teachers	99,3
2	Online learning process is effective	82,2
3	Teachers are fully involved in learning	40
4	Online learning more than 6 meetings	70
5	Offline learning is easier than online	85,9
6	Students are able to use computer applications to complete tasks	83
7	Students have difficulty interacting with friends and teachers	74,1
8	Students are able to use an LMS-based website	80,7
9	The teacher checks the attendance of students	100
10	Examination using an online application	99,3

As many as 85.9% of students stated that offline learning was more fun and easy to follow compared to online. The results of the research in Table 5 also show that online learning can be carried out smoothly because of the ability of students to use computer applications to complete tasks (83%) and 80.7% of students can use LMS-based websites. In essence, students can understand the subject matter through online learning, but in the learning process students reveal the difficulty of communicating with friends and teachers regarding the subject matter (74.1%).
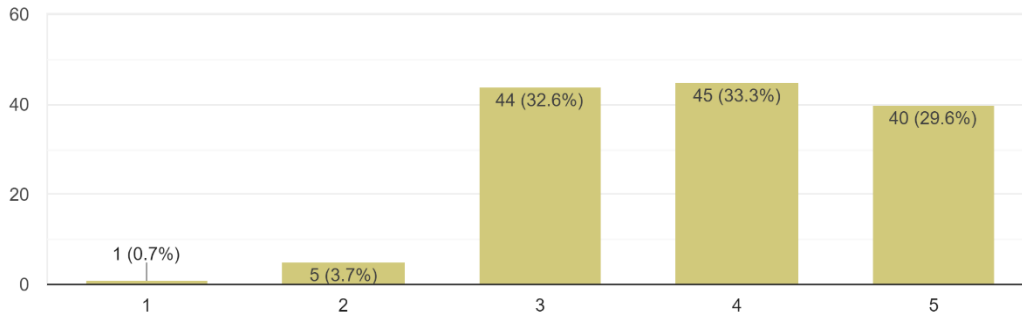
Figure 2. Question and Answer Activities During the Online Learning Process

In the implementation of online learning, students always respond to questions directly through Whatsapp groups or conference meetings (Figure 2). The response of students to learning is important to know the understanding of students and the effectiveness of the delivery of material by the teacher. Students who argue in open questions still have difficulty understanding the lesson because the teacher does not explain the subject matter, while students need direct explanations from the teacher. So far, teachers often give assignments which are 80.7% (Figure 3) and the learning videos are sourced from YouTube.
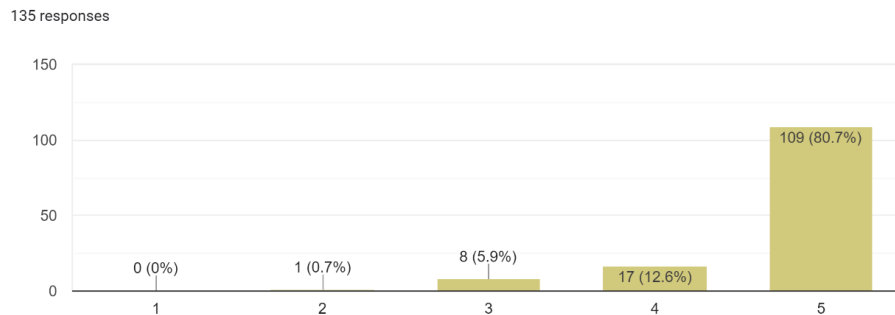

Figure 3. The intensity of the assignment

Online learning makes it easier for students to learn that is not limited by space and time because internet access is widely available with the possession of qualified gadgets. However, the student response questionnaire data showed that only 35% of students agreed with this (Figure 4). In open questions, students argue that assignments are sometimes outside the lesson schedule and students find it difficult to manage their own study time because of many interventions at home such as access to games, television, social media, and homework. Although some students also argue that online learning does not limit discussion time with friends and teachers.
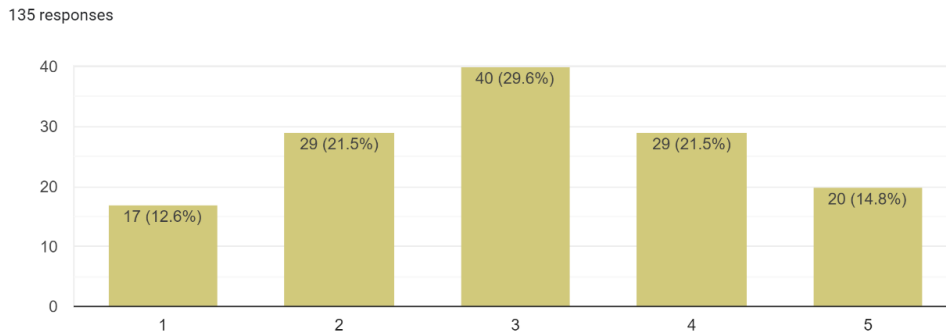
135 responses

Figure 4. Online Learning Perspectives Based on Place and Time

Tasks that have become the main complaints of students in online learning so that students do not understand the material and only answer assignments. Even though online assignments can make it easier to organize tasks that are collected on the cloud drive. However, based on Figure 5, only 48% of students agree that the learning process is better organized. Students think that schools should set a better lesson schedule and topic arrangement on the LMS website.
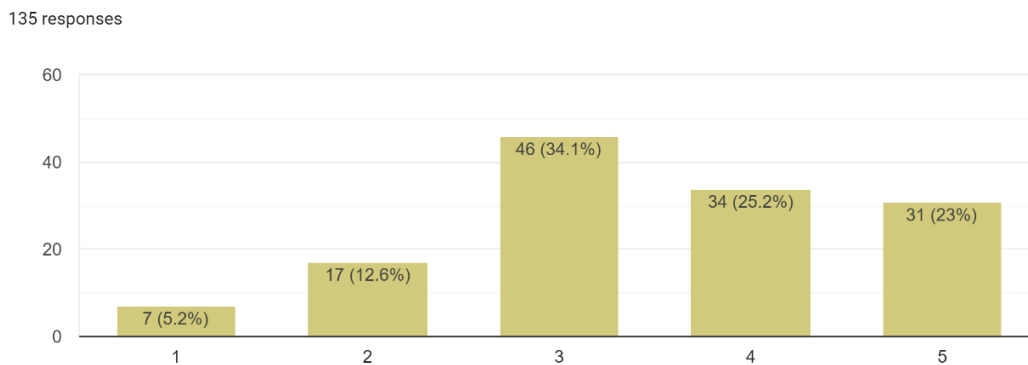
135 responses

Figure 5. Students' responses to online learning are more organized.

Online learning is not constrained by costs and internet access (Figures 6 and 7). However, some students argue that online learning requires high costs to buy internet quotas for students who have not received compensation. Besides, students who live in certain areas find it difficult to get good internet speeds for holding conference meetings and analysis tasks that come from learning videos.
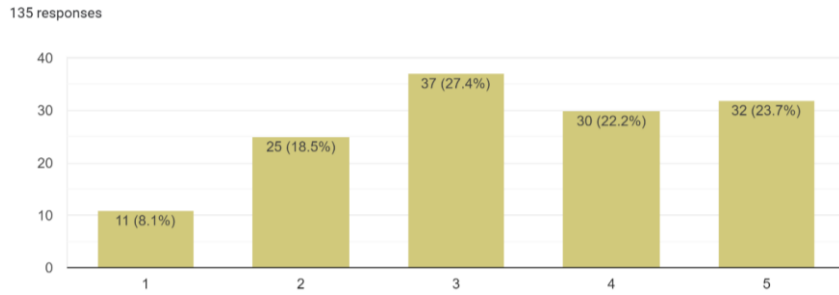
135 responses

Figure 6. Financing Efficiency in Online Learning

Internet network is an absolute requirement for the implementation of online learning activities. As many as 61.4% (Figure 7) stated that students in Bandar Lampung City did not experience problems with the internet network. Internet coverage tends to be stable and smooth. Teachers and students in general have no difficulty finding networks during the learning process.
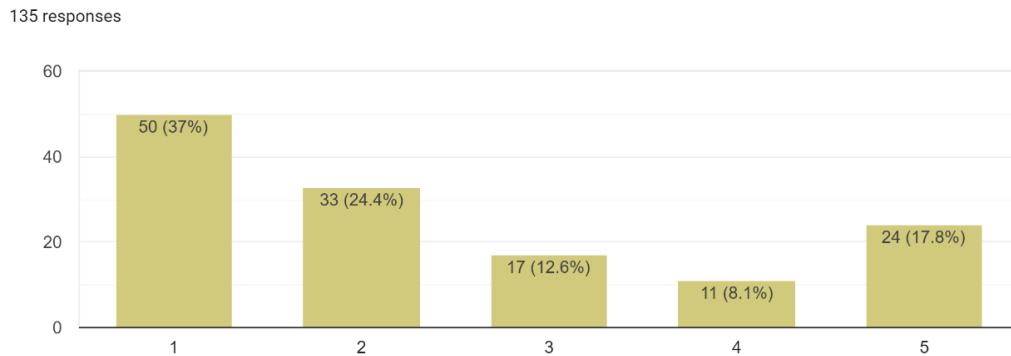
135 responses

Figure 7. Internet Access as a Constraint in the Online Learning Process

Learning evaluations are also carried out online. Applications that are often used for learning evaluation are quizizz (81.5%) and google form (86.7%), while the use of other applications such as kahoot, socrates, quisroom, and educandy is only under 7%. In addition to the assessment by the teacher, during the learning process, students also carry out peer assessments, but not often because 52.6% of students choose sometimes (Figure 8).
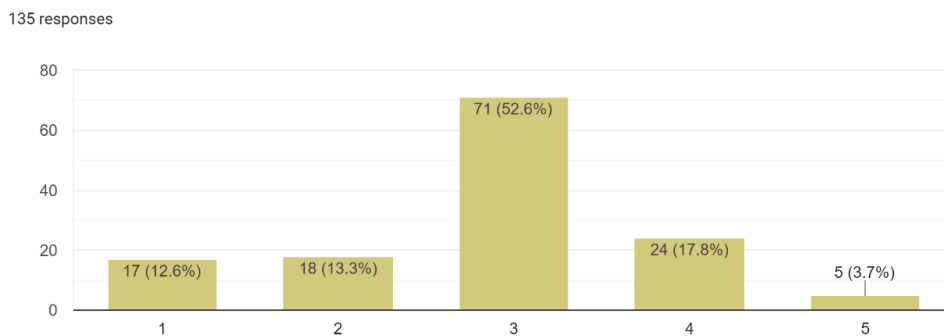
135 responses

Figure 8. Implementation of Peer Assessment in Online Learning

Discussion

The resulting data obtained showed that the results of learning biology carried out online were better understood by students ($p < 0.05$) compared to offline learning which was usually carried out with the lecture and discussion method. It is an important concern that online learning applications have an impact on the cognitive enhancement of students (Table 4). Biology learning that is carried out online is an implementation using the Technological, Pedagogical, Content Knowledge (TPACK) approach which is the 21st-century learning paradigm. TPACK is a framework that integrates Technological Knowledge, Pedagogy Knowledge, and Content Knowledge in a learning context to describe how the lecturer (teacher's) understanding of learning technology is related to the ability of Pedagogical Content and Knowledge to produce effective learning using technology (Koehler and Mishra, 2008).

TPACK is an alternative to solve the problem of learning biology in the experimental class. Schools with experimental groups in this research which were conducted at SMAN 2 and SMAN 5 Bandar Lampung used the TPACK approach by using technology applications on a Learning Management System (LMS) based learning platform through Google Classroom. As many as 98.5% of respondents said that the Plantae material taught in schools uses Google Classroom which includes features for uploading material, attendance, making material topics, conducting exams, collected and correcting assignments, feedback from questions and answers in group discussion forums.

The basic competence in the Plantae material at the high school level is to describe the general characteristics of the kingdom Plantae, Bryophyta, Pteridophyta, Spermatophyta which is the depth of this material requires real diversity of plant samples (Hernawati, et, al., 2020). The implementation of online learning is carried out with cooperative learning, the limitations of learning with a practicum in the laboratory can be overcome through independent assignments by looking for Plantae diversity through observing the environment around students and searching for online learning resources through websites, pictures, and YouTube videos that are valid and believing that the source references are the results of research in the form of articles, books, and encyclopedias on the diversity of Plantae (Likita, Maulina & Sikumbang, 2020). The Google Classroom platform provides uploading of the results of student worksheet data, questions, and answers column in the discussion forum. The presentation of student data was carried out through google meetings.

21st-century learning requires the use of technology in learning activities, but its implementation remains under the supervision of parents and teachers. Various media, discussion rooms, and information acquisition with online services are means of acceleration and convenience in the processing of the latest knowledge (Rahayu, 2017). Ownership of gadgets for every student can be used appropriately and correctly as a form of digital literacy. Teachers are

obliged to provide direction and guidance in learning activities so the use of technology media is effective. Therefore, the integration of the use of technology in learning activities as a medium for discussion space and online testing is something that needs to be implemented (Putriani & Sarwi, 2014).

Online learning activities have an impact that is also a concern to improve further online learning. Table 4 shows that 74.1% of students in learning the Plantae material experience problems in interacting with group friends and teachers. Internet network is the key to ease of interaction in learning (Table 7). Students reveal that not all colleagues in group discussions can smoothly carry out discussions that require more time to get students used to being active in the discussion process.

The overall response to the implementation of online learning by students feels the ease of understanding the material, time efficiency, and learning management carried out by the teacher. In implementing learning, students feel full teacher involvement in learning (Shafina, et.al., 2020). The ease of learning using technology resources is felt by students by obtaining a good depth of material which is evidenced in the data representation in Table 2. Thus, the effort to use the LMS platform with Google Classroom on Plantae material in experimental schools results in good cognitive understanding.

The form of assessment that is used by the teacher in testing cognitive abilities is carried out using the time-limited Google form link https://bit.ly/soalplantae. Students are given a time limit in working on multiple-choice questions as many as 25 questions that are done in 20 minutes. Time limitation is done to minimize cheating by students. Acquisition of responsive data for online learning is carried out by filling in the google form at the end of the learning activity on the Plantae with link http://bit.ly/angketdaringsiswa. Thus, the results of this study can be a reference for teachers in implementing online biology learning with the TPACK approach. Internet network accessibility is a requirement for the implementation of learning and the selection of LMS media in appropriate learning activities to facilitate teachers and students in completing the expected basic competency achievements.

SIMPULAN

Based on the data analysis and the discussion presented, it can be concluded that the implementation of biology learning during the Covid-19 pandemic at the high school education level in Bandar Lampung City has a significant effect, with the TPACK approach with the application of the use of technology literacy based on the Google Scholar LMS platform is an alternative that can be implemented in online learning.

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