J.Biol.Educ. 8 (2) (2019)

Journal of Biology Education

http://journal.unnes.ac.id/sju/index.php/ujbe

The Effectiveness of Blended Learning Implementation in Ecological Chapters Judging from the Understanding of Students' Concepts

Elok Dyah Pitaloka [1], Slamet Suyanto[2]

Biology Education, Postgraduate Program Yogyakarta State University

Info Article

History Article:
Received : June 2019
Accepted : August 2019
Published : August 2019

Keywords:
blanded learning, ecological, chapters judging

Abstract

The use of technology in the process of learning activities can create a new atmosphere in biology learning, namely direct learning and learning using quipper school online. Learning like this is known as blended learning. The class used for the study was taken through cluster random sampling technique namely X MIPA 2 (experimental class) which implements blended learning and X MIPA 3 (control class) which implements a scientific approach. The implementation of blended learning on the topic of ecology is expected to be effective towards understanding concepts. Blended learning is effective on understanding concepts in ecological discussion because they fulfill three indicators, namely: (1) the average posttest of the experimental class 74.95> the mean posttest of the control class is 64.98, (2) The value of understanding the concepts to the two classes shows a significant difference with the values significance of 0,000<0,05, (3) Mean value of N-Gain experimental class 0.52> N-Gain mean value of control class 0.32. Thus, the implementation of blended learning in the ecology chapter in terms of understanding the concept is said to be effective.

Correspondence:
Kampus Karangmalang, Yogyakarta
Email: elokdyahpitalokaa@gmail.com

p-ISSN 2252-6579
e-ISSN 2540-833X

INTRODUCTION

Rapid technological development is a sign of the era of globalization. Along with the development of technology, the use of technology in the form of smartphones and internet access use is increasingly being used by the public, especially among adolescents who sit in junior high school (SMP) education and in high school (SMA) education. This statement, supported by an internet service provider association survey institute, said smartphone usage continues to increase in the number of users from 2017 to 2019. In 2018, a research from the digital marketing agency said that more than 100 million people active smartphone users in Indonesia and Ministry of Communication and Information said Indonesia was seen from the number of people who became active users of smartphones, Indonesia was ranked 4th.

Teenagers in junior and senior high school use smartphones for communication purposes (telephone, SMS, whatshap), to access social media (Instagram, facebook, twitter), and for entertainment (playing games, listening to music, watching youtube). However, adolescents using smartphones in learning activities are still not optimal (Ismanto et al. 2017: 43). The use of smartphones and internet access should be optimized in biology learning, for example, used to find learning resources related to the material being discussed by the teacher and used to access the learning management system (LMS) (García-peñalvo et al. 2013: 893). According to González et al (2015: 32), students using smartphones in learning activities have a positive influence because it will make it easier for students to access learning materials from various sources and smartphones to be used as a tool to access learning media with the use of learning management systems (LMS) such as moodle, Edmodo, quipper school. So that, it can enrich learning resources and increase students' knowledge.

The government in the implementation of the 2013 curriculum also requires the use of technology in the process of biology learning activities and requires students to have the skills to use science and technology. Therefore, the increasing use of smartphones and the internet at the level of junior high and high school is very supportive of the application of curriculum 2013 as desired by the government and educators must optimize the use of technology in biology learning activities. Optimizing the use of technology is done by using LMS in biology learning activities so that learning activities are not only carried out during learning hours but can also be done outside of online lessons. Learning innovations whose learning process is carried out in class through face to face directly during class hours and also conducting online learning activities using the learning management system (LMS) are known to be blended learning (Heinze et al. 2007: 118).

The implementation of online learning activities in blended learning uses the learning management system (LMS). Many online learning management system (LMS) platforms can be used, but quipper school is a learning management system (LMS) that can be used when discussing the ecology chapter. The ecological chapter deals with living things and the environment that includes sub-ecosystems, energy flows, and biogeochemical cycles. In the sub-ecosystem requires the media to describe the types of ecosystems and components in them and their interactions due to the limited time and inaccessibility of various ecosystems to be visited directly by students. In addition, a sub-biogeochemistry video, animation is needed so that students can understand it. On the basis of media needs in the discussion of the ecological chapter, quipper school can be used in online learning activities in blended learning because the features of the quipper school features support this need. So, students can understand the concepts in the discussion on ecology chapter.

Understanding the concepts of students becomes one of the cognitive aspects that must be mastered in order to be able to master cognitive higher. The implementation of blended learning in the chapter on ecology in which online activities through quipper school using smartphone technology and internet access is expected to make students understand the concept of ecology chapter. One of the high schools that supports the use of technology in learning activities, namely SMA N 5 Yogyakarta. Based on this description, research is needed on the effectiveness of the implementation of blended learning in the chapter on ecology in terms of understanding the concepts of students.

RESEARCH METHOD

SMA N 5 Yogyakarta is used as a place of research. Students in Class X SMA N 5 Yogyakarta as a population in the study. Class X MIPA 2 and X MIPA 3 are two classes which through cluster random sampling technique are determined as research samples. Blended learning was applied to Class X MIPA 2 as an experimental class, while class X MIPA 3 as a control class applied a scientific approach. The effectiveness of the implementation of Blended learning can be known through the calculation of independent t-test and N-Gain from the research data in the form of pretest and posttest understanding of concepts from the two classes sampled. Indicators of the effectiveness of Blended learning implementation on conceptual understanding if: (1) Class X MIPA 2 (experimental class) gets a higher posttest grade concept understanding than class X MIPA 3 (control class), (2) Value conceptual understanding to two classes (control and experiment) significantly different, (3) Experimental Class (X MIPA 2) obtaining a greater N-Gain value greater than the control class (X MIPA 3).

RESULTS AND DISCUSSION

This research was conducted to see the effectiveness of blended learning in the chapter on ecology in terms of understanding the concepts of students. The first blended learning effectiveness indicator was class X MIPA 2 (experimental class) obtained a higher posttest value than class X MIPA 3 (control class). To see the fulfillment of the first blended learning effectiveness indicator by processing the pretest and posttest data into the two classes then comparing the posttest value to the two classes and using descriptive statistics as the analysis. The results of calculations and analysis can be seen in Table 1.

Table 1. Descriptive Analysis of Statistics from Pretest and Posttest

Description	Experimental Class Data (X MIPA 2)		Control Class Data (X MIPA 3)	
	Pretest	*Posttest*	*Pretest*	*Posttest*
Number of Students	34	34	28	28
Maximum value	61,29	93,55	64,52	83,87
Minimum Value	32,26	58,06	29,03	48,39
Standard Deviation	8,34	9,33	10,11	9,69
Average	46,68	74,95	47,93	64,98

The ability to understand the initial concepts into two classes (experimental class X MIPA 2 and control class X 3) is almost the same so that it can be used as a class for research. This can be seen in the average value of pretest Table 1. After being given treatment, it was

seen that the first blended learning effectiveness indicator was fulfilled, namely the ability to understand the final concept of the experimental class higher than the dick class. This is indicated by the acquisition of the posttest score value in Table 1, the experimental class 74.95> the control class of 64.98. The measurement of the pretest and posttest understanding of the concepts in the two classes used testing instruments with a total of 31 questions. The concept of understanding the concepts as many as 31 questions includes seven indicators proposed by Aderson & Karthwohl (2001) which include explaining, comparing, influencing, summarizing, explaining, giving examples, and clarifying.

The indicators of the effectiveness of blended learning on the second understanding of concepts, namely the value of understanding concepts from the two classes (experiment and control) differ significantly. This second indicator can be known through the independent t-test through SPSS15. Requirements for testing independent t-test are that the data must be homogeneous and normal so that it requires a test of normality and homogeneity. Tests are presented in the table below.

Table 2. Normality Test of Concept Understanding Data

Class	Data	*Kolmogorov-Smirnov*[a]		
		Statistic	**df**	**Sig.**
Eksperiment	*Pretest*	0,08	34	0,200*
	Posttest	0,11	34	0,200*
Kontrol	*Pretest*	0,11	28	0,200*
	Posttest	0,102	28	0,200*

Table 3. Homogeneity Test of Concept Understanding Data

Data	*Levene Statistic*	Df1	Df2	Sig.
Pretest	0,62	1	60	0,44
Posttest	0,01	1	60	0,97

Data on pretest and posttest understanding of the concept were declared normal and homogeneous because in Table 2. sig values from the fourth normality test data 0.200> 0.05 and homogeneity test in Table 3. obtained the sig pretest value of 0.44> 0.05 and the sig value of posttest 0.97> 0.05. Independent t-test testing requirements are met so that you can do the testing. Independent t-test tests are presented in Table 4.

Table 4. Independent Testing of Concept Understanding t-tests

Data	Sig.	Information
Posttest	0,000	There are significant differences

Independent t-test testing from Table 4 shows the fulfillment of the indicators of the effectiveness of blended learning on the second understanding of concepts, namely the value of understanding concepts from the two classes (experiment and control) significantly different. This is seen in table 4, the sig value. 0,000 <0,005 so there is a significant difference between the ability to understand the experimental class concept and the understanding of the concept of the control class. The indicators of the effectiveness of blended learning towards understanding the first and second concepts have been fulfilled, then testing is carried out to

fulfill the third blended learning effectiveness indicator through N-Gain testing, the results of which are presented in Table 5.

Table 5. N-Gain Test of Concept Understanding

Class	Nilai N-Gain		
	Minimum	**Maximum**	**Average**
Experiment (X MIPA 2)	0,21	0,89	0,52
Control (X MIPA 3)	0,12	0,67	0,32

Table 5. shows the third blended learning effectiveness indicator is fulfilled because the average N-Gain value of class X MIPA 2 (experimental class) is in the moderate category of 0.52 and the N-Gain mean value of class X MIPA 3 (control class) in the medium category of 0.32. Even though the two classes were average the N-Gain value was moderate, but the X class MIPA 2 (experimental class) obtained a higher N-Gain value than the control class.

Based on the descriptive analysis, the independent t-test and N-Gain mean tests show the three blended learning effectiveness indicators for understanding the concepts fulfilled. Thus, it can be said that the implementation of blended learning in the ecology chapter is effective towards understanding concepts. The effectiveness caused by class X MIPA 2 with the implementation of blended learning has learning activities that are different from class X MIPA 3 which only applies the scientific approach. Learning activities in the implementation of blended learning that have a positive impact on understanding concepts, namely:

(1) Direct learning activities in the classroom in the application of blended learning give a positive impact on students' understanding of the material on the subject of ecology because with direct learning activities students can interact directly with other students and teachers in the classroom. As well as students can ask things that want to know students directly. So that students can improve their understanding of ecological material. The teacher can also assess affective aspects which can only be assessed through direct learning.
(2) The use of smartphone and internet technology makes it easier for students to access material sources on the internet so that students can get many sources from within the country and from abroad so that it will enrich students' knowledge and understanding of concepts related to the ecology chapter. The teacher also gives freedom to students to access information provided that the information sought is in accordance with the material discussion.
(3) The use of smartphone and internet technology makes it easier for students to access material sources on the internet so that students can get many sources from within the country and from abroad so that it will enrich the knowledge and understanding of students' concepts related to the ecology chapter. The teacher also gives freedom to students to access information provided that the information sought is in accordance with the material discussion.
(4) Online learning activities in the implementation of blended learning use quipper school and provide a positive influence on understanding concepts because quipper school presents supporting features. The existence of online learning activities through the quipper school online platform provides ecological material with different forms from books. The book presents material in the form of text and images while quipper school presents material not only in the form of text and images but also in the form of video,

audio, and animation (Daulay et al. 2016). So, students will easily understand the concepts in ecological discussion. According to Shih (2010), videos presented in online platforms on the implementation of blended learning can improve the weaknesses of students in understanding the material because students can easily understand through video with an explanation of the images and sounds that explain the material in the video. Students can also learn quipper school material repeatedly and can be learned before entering direct learning in class (Sandi, 2012: 248).

(5) Quipper school provides a chat feature that can help students to ask concepts related to ecological material that has not been understood to students and teachers so that understanding the concept increases. The online platform helps students to ask questions related to ecological material outside the learning hours, this gives freedom to students and students are always connected with teachers and other students (not bound by place and time) (Dwiharja, 2015: 342).

(6) Quipper school provides quiz features made by the Teacher. After each lesson in class, the teacher gives assignments to students and students are asked to answer quiz. The existence of this quiz requires students to study the material so that the understanding of the concept of students increases (Daud & Rahmadana, 2009: 35).

These activities in the implementation of blended learning provide the effectiveness of blended learning in the ecology chapter on understanding concepts. Other studies also found results similar to the results of this study, such as the research conducted by Marini at al. (2017: 87) suggests that the use of online platforms in online learning activities can improve student learning outcomes. Another study conducted by Murni et al. (2005: 940), states that students possess the ability to understand better concepts by implementing blended learning on biology subjects.

CONCLUSION

Based on the results of calculations, analysis and discussion it can be concluded that the implementation of blended learning in the ecology chapter is effective towards understanding concepts. The indicator said that the implementation of blended learning towards understanding the concept has been fulfilled because (1) Class X MIPA 2 (experimental class) obtained a higher posttest grade concept understanding than class X MIPA 3 (control class) (74,95>64,98), (2) Value of conceptual understanding to two classes (control and experiment) differ significantly (0,000<0,05), and (3) Experimental Class (X MIPA 2) obtains a greater N-Gain value greater than the control class (X MIPA 3) (0,52>0,32).

REFERENCES

Anderson, L. W., & Krathwohl, D. R. (2011). *A taxonomy for learning, teaching and assessing: a revision of vloom's taxonom*. New York: Longman Publishing

Daud, F., & Rahmadana, A. (2009). Pengembangan media pembelajaran biologi berbasis e-learning pada materi ekskresi kelas XI ipa 3 SMA N 4 Makasar. *Jurnal Bionature*, *16*(1), 28–36. https://doi.org/http://ojs.unm.ac.id/bionature/article/view/1566/630

Daulay, U. A., Syarifuddin, & Manurung, B. (2016). Pengaruh Blended Learning Berbasis Edmodo dan Motivasi Belajar Terhadap Hasil Belajar IPA Biologi dan Retensi Siswa pada Sistem Peredaran Darah Manusia di Kelas VIII SMP Negeri 5 Medan. *Jurnal Pendidikan Biologi*, *6*(1), 260–266.

Dwiharja, L. M. (2015). Memanfaatkan edmodo sebagai media pembelajaran akutansi. *Prosiding Seminar*

Nasional 9 Mei 2015, 332–344.

García-peñalvo, F. J., Conde, M. Á., Zangrando, V., & Griffiths, D. (2013). Trailer project (tagging, recognition, acknowledgment of informal learning experiences) a methodology to make learners ' informal learning activities visible to the institutions. *Journal of Universal Computer Science*, *19*(11), 1661–1683. Retrieved from https://www.researchgate.net/publication/256839537%0ATRAILER

González, M. Á., González, M. Á., Martín, M. E., Llamas, C., & Martínez, Ó. (2015). Teaching and learning physics with smartphones. *Journal of Cases on Information Technology, 17*(1), 31–50. https://doi.org/10.4018/JCIT.2015010103

Heinze, A., Procter, C., & Scott, B. (2007). Use of conversation theory to underpin blended learning. *International Journal of Teaching and Case Studies*, *1*, 108–120. https://doi.org/10.1504/IJTCS.2007.014213

Ismanto, E., Novalia, M., & Herlandy, P. B. (2017). Pemanfaatan smartphone android sebagai media pembelajaran bagi guru SMA Negeri 2 Kota Pekanbaru. *JURNAL Untuk Mu Negeri*, *1*(1),42–47. Retrieved from http://ejurnal.umri.ac.id/index.php/PengabdianUMRI/article/view/33

Marini, Sulisworo, D., & Ishafit. (2017). Pengaruh Pembelajaran Blended Learning Berbantukan Media Aplikasi Quipper School terhadap Minat, Kemandirian, dan Hasil Belajar pada Materi Gelombang Mekanik Siswa Kelas XI SMA Negeri 1 Cawas. *Jurnal Penelitian Pembelajaran Fisika*, *8*(2), 81–88. Retrieved From Http://Journal.Upgris.Ac.Id/Index.Php/JP2F%0apengaruh

Murni, D., Romlah, S., & Hodijah, N. (2005). Pengaruh Blended Learning Berbasis Scaffolding Terhadap Hasil Belajar Mahasiswa Pada Konsep Substansi Genetika. *Isu-Isu Kontemporer Sains, Lingkungan, Dan Inovasi Pembelajarannya*, 936–941.

Sandi, G. (2012). Pengeruh blended learning terhadap hasil belajar kimia ditinjau dari kemandirian peserta didik. *Jurnal Pendidikan Dan Pengajaran*, *jilid 45*(No.3), 241–251.

Shih, R. (2010). Blended learning using video-based blogs : Public speaking for English as a second language students. *Australasian Journal of Educational Technology*, *26*(6), 883–897. https://doi.org/https://doi.org/10.14742/ajet.1048