Unnes.J.Biol.Educ. 9 (2) (2020)

Journal of Biology Education

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

The Effectiveness of Blended Learning on Students' Learning Outcomes and Conservation Behavior

Dimas Fahrudin[1]✉, Krispinus Kedati Pukan[1],

[1]Biology Department, FMIPA, Universitas Negeri Semarang, Indonesia

Article Info

Article History:

Received: January 2020
Accepted: July 2020
Published: August 2020

Keywords:
Blended Learning, Effectiveness learning outcomes, Cell material, Attitude of conservation

Abstract

Based on observations and interviews, the results of learning activities are disrupted by the school, teacher, and student agenda. This research aims to know and describe the effectiveness of the application of blended learning models for learning outcomes and conservation attitudes of MAN 1 Surakarta students. This research uses a quasi-experiment. The research design was the Matching Pretest – Posttest Comparison Group Design. The population in the study was class XI of MAN 1 Surakarta student. The samples were class XI MIA 4 and XI MIA 5. The N-Gain test results show the difference in the learning outcomes of both experimental classes. Increased outcomes of female class higher (64%) than the male`s class (51%). Nevertheless, based on the criteria N-gain, both classes are included in the medium criteria. The number of students per N-gain criterion is also different. In the male experiment, Class 7 students enter the high, 23 students are medium category, and six students enter the low category. In comparison, in the female class, 16 students come to the high category, 19 medium categories, and no entry category low. The entire sample submission was 76%, in the men's class of 69.5%, and in the women's class 82.8%, the results of the students' attitude recapitulation showed that students in the class were higher than the son's grade. Teachers and students give good responses to the learning model applied. The conclusion of the study is the implementation of learning blended improves the students' learning outcomes and conservation behavior

✉ Correspondence Address:
D6 Building 1st Floor Jl Raya Sekaran Gunungpati Semarang
E-mail: dimasfahr@gmail.com

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

INTRODUCTION

The cell is an important concept to be comprehensively understood by students. It becomes the basis to learn the next biological materials such as tissue and organ system in the human body. The observations conducted from 20 April 2019 to 25 April 2019 in XI IPA class 4.5 and 6 MAN 1 Surakarta, found that cell learning process was exciting and interesting, especially during practicum. Nonetheless, that statement is not equal with the students' understanding in cell. The data of the National Exam (UN) in MAN 1 Surakarta from 2017 to 2019 indicates that the results of UN cell material are low. The students' acquisition of UN cell concept in the academic year of 2015/2016 to 2016/2017 increased from 50.79% to 57.35%, while from 2017/2018 to 2018/2019 decreased from 57.35% to 53.95%. (Kemendikbud, 2019).

Fluctuations in students' knowledge acquisition may be caused by internal and external factors. Internal factors involve learning motivation, learning style, and student health. While external factors include learning media, learning resources, learning methods, and learning proses (Rijal & Bachtiar, 2015). The results of identification during observation showed that some teachers' and students' activities could disturb face-to-face learning. Some of these activities include the total meetings, teachers' activities, study tours, competitions, and additional material lessons for grade XII. While the teacher is unable to carry out face to face learning, the teacher gives a task for students to study independently. The results students interviews show that they dislike studying individually in the class as instructed by the teacher. Some students chose to play online games (PUBG, Free Fire, as well as Mobile Legends), leave the classes for haircuts, eat in the school cafeteria and sleep at the unit of student health room. The various activities of the students reflect the low attitude and responsibilities of students. Therefore, the aspect of conservation attitudes in this research is responsibility.

The millennial era and the industrial revolution of 4.0 technology are overgrowing. A variety of digitalization began to develop, especially in the learning model. There are various application platforms, such as the Ruangguru, e-guru, and Kihajar application from Kemendikbud. It is a challenge and a potential in the learning process; the challenges faced are the utilization of technology that is not optimal in learning proces in MAN 1 Surakarta (Permana, 2015). On the other hand, internet and smartphone access are a potential developed for the learning model. That is the learning model implemented without face-to-face (online) or face-to-face (offline) that is packaged into a learning model.

Blended Learning models are chosen because it is flexible to be combined with other learning methods such as discussion, games, presentations, and others. Blended learning or hybrid learning is a model that combines learning with the use of electronic media with no face-to-face (online) and face to face (offline) learning (Wang *et al.*, 2015). Application of blended learning models has the main advantage when learning can not be done by face-to-face. Then learning can be done online learning but still pay attention to the effectiveness and objectives of learning (Stockwell *et al.* , 2015).

Based on the background of the study, it needs to be studied in-depth about the effectiveness of the blended learning model on the cell concept to students' learning outcomes and conservation behavior. The Blended learning model is expected to give an effective learning experience.

RESEARCH METHOD

This research was conducted at MAN 1 Surakarta in the odd semester in the academic year of 2019/2020. The population of this study was all the entire students of grade XI MAN 1 Surakarta consisting of XI MIA 1 until XI MIA 5. The sampling technique was Purposive Sampling. The sample used was two classes, namely class XI MIA 4 and XI MIA 5, with the consideration teachers who taught the same grade, and he able to bring a mobile phone. The data in this study involve learning interest , students' learning outcomes, and teacher responses analyzed by descriptive quantitative percentage.

RESULTS AND DISCUSSION

The purpose of this study is to analyze and describe the effectiveness of the blended learning model on the cells material to students' learning outcomes and conservation behavior. The effectiveness of blended learning model in the cell concept was measured from the achievement based on predetermined effectiveness indicators, namely (1) learning interest reaches ≥ 75% of students in the interested and or very interested category, (2) learning classical mastery ≥ 75% with criteria minimal mastery (KKM) of 75. (3) There is an increase in student learning outcomes (Djamarah & Zain, 2002).

Students' Cognitive Learning Outcomes

The results of learning in the cognitive are obtained through pretests and posttest in two experimental classes. Once data was analyzed using Microsoft Excel acquired the difference of learning outcomes between both classes of experimentation. The recapitulation of student learning outcomes is presented in Table 1.

Table 1. Difference Results Pretest and Posttest of son class and daughter class

Category	Pretest		Posttest	
	Male	Female	Male	Female
Lowest score	37.17	35.10	67.9	75
Highest score	42.49	41	75	80.5
Average score	39.8	36.31	71.4	77.7
Number of students completed	0%	0%	69.5%	82.8%
Total students not complete	100%	100%	30.5%	17.2%
KKM			75	

In addition to the difference in the posttest value, increased learning outcomes after the application of the blended learning model shown with the N-gain value indicates a significant difference between classes (Table 2).

Table 2. Difference Results Pretest and Posttest of son class and daughter class

	Male class	Female class
Classical-proof	69.40%	82.86%
N-gain	0.51 (51%)	0.64 (64%)
Criteria	Medium	Medium
Complete submission of the entire sample	76%	

Improved female learning outcomes higher (64%) than the male class (51%). Nevertheless, based on the criteria N-gain, both classes are included in moderate criteria (Table 2). However, based on the criteria N-gain, both classes are included in the medium criteria, with the composition of the number of students' category is not equal between classes (Table 3).

Table 3. Number of students from N-gain increase criteria.

Range(%)	N-gain criteria	Number of students	
		Male class	Female class
$g > 70$	High	7 (19.44%)	16 (45.71%)
$30 < g \leq 70$	Medium	23 (63%)	19(54.29%)
$g \leq 30$	low	6 (19.44%)	0(0.00%)

The results of cognitive learning were obtained after the posttest carried out in both experimental classes. The results of the Complete submission of the entire sample analysis are 76.05% (Table 2). The classical submission to the male experimental class was 69.40% lower than the female experiment class that is 82.86%. The increase in learning outcomes in both groups is medium-breasted. The criteria are known after the N-gain test in each experiment group. At the time of learning, students felt interested in learning the cell material with the blended learning model. This is because students learn from various learning resources, such as books, YouTube, and websites. The Data is in accordance with Zacharis' statement (2015), who explained that diverse learning resources will spark interest and reduce students' boredom in learning. Interest in raising awareness to carry out responsibilities in carrying out tasks and learning activities to understand the material (Zacharis, 2015).

The student's ability to understand cell bioprocesses is also excellent. This can happen because in learning activities, students opened YouTube to understand the bioprocesses in the cells. Students discuss the videos in a group so make a better understanding of bioprocesses. The better students' understanding, the better students' learning outcomes. This explanation is in line with previous research explaining the application of blended learning models affect the improvement of learning outcomes (Ashby *et al.*, 2011).

During the learning process, there is a group discussion conducted by students with the online guidance of the teacher. Grouping and engaging students in learning processes through discussions and tasks trigger students to become active. The level of students' activity increases because the teacher allows students to research their knowledge (Vuopala *et al.*, 2015). This method conditioned the students to work in randomly formed groups. Students contribute ideas to solve group tasks/problems. The group activities in this research were going well because of the simple online learning instructions. Through a group of students can do 1) actively listening to each other, 2) sharing ideas and learning resources, 3) giving feedback to build ideas, 4) making a deal in a democratic way. Such activity can develop communication and collaboration skills to trigger the ability of critical tand solutive thinking (Gillies, 2016). The improvement of students' involvement are related to environmental conditions ,one of the factors that also affect learning outcomes. When the learning has a good atmosphere and is conducive, the outcomes are also good. Following the statement, Khanifah *et al*. (2012) said that the active students affect learning outcomes during discussion and presentation.

Blended learning makes students easy to learn and understand the cell concept. This is because students can access learning materials anywhere and anytime, so it was increasing the learning intensity of students. If learning is difficult, students can ask the online discussion grub, so, learning resources are not only focused on textbooks and student worksheets but also articles and YouTube. The ability to learn and access the material can improve students' motivation in learning. Motivation raises the desire that encourages students to perform learning activities to achieve certain objectives. When the students' learning desire increases, teachers can easily give direction and purpose of the learning to be achieved. The harmonious relationship between learning motivation and learning achievement has been explained by Zuldafrial (2012) said that motivation could make students more active in learning so that the achievements and outcomes are expected to be better.

Based on a table of learning outcomes, there are differences between male class and female class learning outcomes (Table 1). The improvement and learning outcome of the male classes was lower than the female class. Some factors can affect the difference between classes of experiments, such as1) the male's class learning with the technology does not run well. When teachers instruct students to open a learning resource from YouTube, some of the male students opened WhatsApp and chat with friends. Consequently, students were left behind in the learning. This condition is inversely proportional to the learning condition in the female experiment class, 2) The female students carefully follow the learning steps that have been instructed by the teacher, 3) Female students are also more discipline in collecting assignments online. In the online learning process, teachers asked group leaders to lead groups of independent self-learning, group leaders submitted photos of their group activities. The different results between classes of experiments are found in this activity. 4) All members of the female class participated in the discussion and work group assignments while in the male's class, some group members were inactive in discussion and work assignment. The differences in the participation and learning outcomes of the female class have been described by Nuryoto in Farianti (2016) said that female students are more diligent. This one of them is due to gender equality. This condition provides its own motivation for the female to compete with the male students in academic achievement so that the academic score of the female students can be higher than the male students.

Although the score of affective and psychomotor students are excellent. In this study, there were 11 male and six female students who had not reached the criteria, and it was influenced by several factors. Referring to the analysis of students' responses, the male class is known that ,11 students disagree with the use of the blended learning model. As for the female class, experiments are known, six students disagree with blended learning. The students' responses indicate that the student is still struggling to follow the

blended learning model. The student is more likely to prefer full face-to-face learning. The presence of teachers in the classroom cannot be replaced, because the students do not like online learning .The face to face learning is so important to awaken the students' philosophy and emotional sense of learning (Poon, 2013).

On the other hand, based on the analysis of the students' learning guidance before given the treatment that the students who did not complete minimum criteria get the low pretest scoreso that posttest score also tends to be low. This can happen because students' ability to acquire concept varies. Several factors are affecting the ability of students in acquiring material among others, such as 1) less optimal brain activities, for example, less reading so that the brain is slow in capturing and analyzing information, 2) less learning rehearsal that affects the poor memory, 3) low students' IQ (Intelligence Quotient) , 4) sensory impairment, especially hearing and vision, 5) factor of heredity or gene (Yuliati & Martuti, 2014).

Student`s Affective Learning Outcomes

Besides cognitive score, another parameter measured in this study, the affective score indicated by the score of student conservation attitudes. The student conservation attitude measured is a sense of responsibility in following and understanding learning and working on the given task shown in Table 4.

Table. 4 Learning outcomes of the affective attitude of responsibility

	Aspects of responsibility	Assignment			Average	Criteria
		1	2	3		
Male class	Task work	81.06	77.50	86.50	81.70	Excellent
	Practicum and Learning	82.70	78.30	84.50	82,.	Excellent
Female class	Task work	82.60	85.26	81.29	83.05	Excellent
	Practicum and Learning	83.70	87.30	81.90	84.30	Excellent

Students' conservation attitudes vary at each meeting. A decrease in the attitude value of 4.39% responsibility occurred at the second meeting in the male's class and again increased by 11.61% from the second meeting or 5.77%. Meanwhile, in the female's class, there was an increase at the second meeting of 3.22% and thus decreased at the third meeting of 4.66% from the second meeting or 1.59% from the first meeting. Despite the decline in the attitude value on the third day, the average attitude of the female class is still higher than the male class. Further, the number of students each class per category can be seen in table 5.

Table. 5 Attitude score in both experimental classes

Range Value	Attitude Score Criteria	Number of Students	
		Male class	Female class
81% – 100%	Excellent	18 (50%)	20 (57.,14%)
61% – 80%	Good	18 (50%)	15 (42.86%)
41% – 60%	Good enough	0	0
21% – 40%	Not good	0	0

The affective assessment is an assessment related to attitude. Attitudes expressed in the three domains of ABC, namely *Affect* or feelings of delight and displeased *Behaviour* behaviors that follow the feelings that arise, such as approaching or avoiding and *Cognition* assessment of the object of attitude such as good and not good (Ridlo & Irsadi, 2012). The conservation attitude in question is the attitude of responsibility. The attitude of responsibility is a person's attitude or behavior to perform tasks and duties consciously without compulsion. The attitude of responsibility indicators involves working on the task in accordance with the obligation (Permana, 2017). The aspect of responsibility that is assessed in this study includes the students' responsibilities in following the students' learning and responsibilities in doing their assignments and tests honestly according to the rules.

The responsibility of the students in the following learning. The student's responsibility in the following learning is the way students respond and contributeto the learning process. In this study, the

students' activities were in listening to the learning process, asking and answering questions. The score of the students' responsibilities in the following learning process is 82.56% for male and 84.30% for female class, both of which are in good category (Table 4). One of the factors affecting the score is the application of the blended learning model. The model focuses on the responsibilities and participation of students (Bower *et al.*, 2015).

The second aspect is the student's responsibility for doing the test and work on tasks. Indicator of success in this aspect is when students good work on both group and individual assignments, collecting them on time and honestly working on individual tests. The value of the responsibilities of the work on the task and individual tests of male students is 82.56% and 84.30% for female students, both are in Excellent categories. Learning proses with blended learning model indicate students work on tasks promptly. The online media used in task collection suggests the time of the students collecting the tasks. At the time of work, the students will be working on the questions according to the rules and honesty. In the results of interviews, the teacher expressed that the school of MAN 1 Surakarta does indeed prioritize the character and good attitude of students.

Student`s Psychomotoric Learning Outcomes

Psychomotoric score is obtained based on the presentation of the student's discussion and proficiency in a step-by-step practicum. The psychomotoric score is presented in Table 6.

Table 6 Results of psychomotoric learning

Aspect of activities	Average		Categories
	Male class	Female class	
Presentation	83.50	80.26	Excellent
Practicum	83.28	83.94	Excellent

The first aspect is students' practicum skills, and both in male and female classes are involved into excellent categories with score of 83.28 on the male class and 83.94 on the female class (Table 6). Although ,some students did not perform practicum with sequential and did not get good results. This is happened because students were less prepared for practicum and or did not read practical instructions. readiness Students in implementing practicum is very influential in practicum activities. If before carrying out the practicum activities of students learn and understand the practical instructions, students will be active in conducting practicum. On the contrary, if the students are not yet prepared and do not understand the practical instructions, the students will tend to be passive and less participating in the group activity (Napier *et al.* 2011).

The second aspect is the student skills in the presentation. Assessed indicators are the ability of students to open the presentation, attitudes, and how to convey information and answer questions. When a student's presentation displays the results of a task using Powerpoint. Students explain interchangeably with a loud voice. Implementation of blended learning enhances students' activity. This is evidenced by the disagreements between students and thus triggering the debate among students. Students are argumented based on the sources of information already understood. Many online learning resources used are a major factor in the occurrence of disagreements.

During the debate, the teacher acted as a facilitator. The blended learning plays role to enhance good communication skills, learn to appreciate others' opinion. Practice to manage information logically and can improve student participation in learning. The research results in both experimental classes are not much different. The male students gained average in excellent categories, so the female students gained a flat average of the criteria with very good categories (Table 6). The application of blended learning provides many opportunities for students to actively participate, such as explaining and enhancing abilities through guided digital literacies (Kiviniemi, 2014). The problem encountered is that some students have a quiet character. It has an impact on students when asked to display the results of the discussion in front of the class. Some students have a few dugs, who aaffect material exposure.

Overall the learning steps have been conducted.But, there are some difficulties found in this research. Among them, researchers have to deal with the students' condition. Male students tend to be more active but difficult to concentrate. At the time of learning with the blended learning carried out, the

concentration of students tends to be easily distracted by other applications found on smartphones. Therefore, the thing to note during the implementation of the model is to use some of the methods that effectively take control of the activities of the male students. Because effective methods applied to the class of females are not necessarily effective when applied in the male class.

CONCLUSION

Based on the results of data analysis and discussion, it is concluded that the implementation of blended learning on cell concept effectively improves the learning outcomes and conservation attitudes of MAN 1 Surakarta students. This is because the student's classical completeness has reached 76%, and the conservation attitude of students goes in an excellent category.

REFERENCES

Ashby, J, Sadera, W. A. & McNary, S.W., 2011. Comparing student success between developmental math courses offered online, blended, and face-to-face. *Journal of Interactive Online Learning,* 10(3), 128-140.

Bower, M., Dalgarno, B., Kennedy, G.E., Lee, M.J. & Kenney, J., 2015. Design and implementation factors in blended synchronous learning environments: Outcomes from a cross-case analysis. *Computers & Education*, 86, 1-17.

Djamarah, S.B &Zain, A. (2008). *Strategi Belajar Mengajar*. Jakarta: Rineka Cipta.

Farianti, Rahmi & Agustina F. (2016). Perbedaan hasil belajar siswa laki-laki dengan siswa perempuan menggunakan pembelajaran kooperatif model mind mapping pada pokok bahasan klasifikasi makhluk hidup siswa kelas vii di smp it nurul muhajirin batam. Simbiosa, 5(1), 16-24.

Gillies, R. M. Cooperative Learning: Review of Research and Practice. *Australian* Journal *of Teacher Education,* 41(3), 39-54.

Kemendikbud (Kementrian Pendidikan dan kebudayaan). (2019) Laporan Hasil Ujian Nasional Retrieved from *http://puspendik.kemdikbud.go.id/hasil-un/* 27 June 2019.

Khanifah, S., Pukan, K.K. & Sukaesih, S., (2012). Pemanfaatan lingkungan sekolah sebagai sumber belajar untuk meningkatkan hasil belajar siswa. *Journal of Biology Education*, 1(1), 66-73.

Kiviniemi, M.T., (2014). Effects of a blended learning approach on student outcomes in a graduate-level public health course. *BMC medical education*, 14(1), 47.

Napier P. N., SonalD.& Smith, S. (2011). Transitioning to blended learning: understanding student and faculty ferceptions. *Journal of Asynchronous Learning Networks,* 15(1), 20-32.

Permana, F. H. (2015). Pengembangan buku ajar biologi berbasis blended learning sebagai bekal hidup di abad 21 untuk mahasiswa S1 Kimia FMIPA UM. In *Prosiding Seminar Nasional Pendidikan Biologi* Hlm. 50-61

Poon, J., 2013. Blended learning: An institutional approach for enhancing students' learning experiences. *Journal of online learning and teaching*, 9(2), 271-288..

Ridlo, S. & Irsadi, A. (2012). Pengembangan nilai karakter konservasi berbasis pembelajaran. *Jurnal Penelitian Pendidikan*, 29(2), 145-154.

Rijal, S. & Bachtiar, S. (2015). Hubungan antara Sikap, Kemandirian Belajar, dan Gaya Belajar dengan Hasil Belajar Kognitif Siswa. *Jurnal Bioedukatika*, 3(2), 15-20.

Stockwell, B. R., Stockwell, M. S., Cennamo, M., & Jiang, E. (2015). Blended learning improves science education. *Cell*, 162(5), 933-936.

Vuopala E, Hyvönen P, & Järvelä, S. (2015). Interaction forms in successful collaborative learning in virtual learning environments. *Active Learning in Higher Education,* 17(1)*, 25-38*

Wang, Y., Han, X., & Yang, J. (2015). Revisiting the blended learning literature: Using a complex adaptive systems framework. *Journal of Educational Technology & Society*, 18(2), 380-393

Yuliati, T. &Martuti, N. K. T. 2014. Efektivitas penerapan metode *Field Trip* untuk meningkatkan hasil belajar dan kepedulian siswa terhadap lingkungan. *Jurnal Pendidikan Matematika dan Sains,* 2(2), 178-186.

Zacharis.N.Z.2015. A multivariate approach to predicting student outcomes in web-enabled blended learning courses. *Internet and Higher Education,* 27, 44-53.

Zuldafrial. (2012). *Penelitian Kualitatif.* Yogyakarta: Media Perkasa