The effect of blended learning application with flipped classroom method on student learning outcomes in biology learning at SMA Negeri 9 Sinjai

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Abstract: Educators need the right learning media to overcome the problems of the learning system, especially in Biology subject matter of the human circulatory system. The purpose of this study was to examine the effect of applying blended learning with the flipped classroom method on student learning outcomes in biology learning at SMA Negeri 9 Sinjai. The type of research used is a quasi-experimental with random selection of groups (random sampling). The data collection technique used is a test technique in the form of pretest-posttest. The pretest was conducted to collect data on the students' initial abilities, while the posttest was conducted to test the effect of treatment. In this study, differential statistical tests and 3 statistical tests were carried out, namely normality test, homogeneity test, and hypothesis testing. The results of the study indicate that there is a significant effect on the application of blended learning with methods flipped classroom on student learning outcomes at SMA Negeri 9 Sinjai. The hypothesis in this study can be said to be proven because $0.000 <$ from 0.05 or by looking at the t count of 7.648 while the t table is 2.018, thus t count > ttable. This means that there is a significant influence between the learning outcomes of students who are taught by applying blended learning with the flipped classroom method and students who are taught without applying blended learning with the flipped classroom method.

Keywords: blended learning model, flipped classroom method, learning outcomes

Abstrak: Pendidik membutuhkan media pembelajaran yang tepat untuk mengatasi permasalahan sistem pembelajaran khususnya pada mata pelajaran Biologi materi sistem peredaran darah manusia. Tujuan dari penelitian ini untuk menguji pengaruh penerapan *blended learning* dengan metode *flipped classroom* terhadap hasil belajar siswa pada pembelajaran biologi di SMA Negeri 9 Sinjai. Jenis penelitian yang digunakan adalah eksperimen semu (*quasy eksperiment*) dengan pemilihan kelompok secara acak (*random sampling*). Teknik pengumpulan data yang dilakukan adalah teknik tes berupa *pretest-posttest*. *Pretest* dilakukan untuk mengambil data kemampuan awal siswa, sedangkan *posttest* dilakukan untuk menguji pengaruh perlakuan. Dalam penelitian ini dilakukan uji statistik diferensial dan 3 uji statistik lainnya yaitu, uji normalitas, uji homogenitas, dan uji hipotesis. Hasil penelitian menunjukkan bahwa terdapat pengaruh signifikan penerapan *blended learning* dengan metode *flipped classroom* terhadap hasil belajar siswa di SMA Negeri 9 Sinjai. Hipotesis pada penelitian ini dapat dikatakan terbukti karena 0,000 < dari 0,05 atau dengan melihat t hitung sebesar 7,648 sedangkan t tabel sebesar 2,018 dengan demikian t hitung > t tabel. Artinya terdapat pengaruh yang signifikan antara hasil belajar peserta didik yang diajar dengan menerapkan *blended learning* dengan metode *flipped classroom* dan peserta didik yang diajar tanpa menerapkan *blended learning* dengan metode *flipped classroom*.

Kata Kunci: hasil belajar, model *blended learning*, metode *flipped classroom*

Introduction

Education is an important thing in human life. Education possible people to develop their potential to make a difference which is better and leads to a better way of life in the future. Education is a very important thing because with education people can develop their potential to be able to lead their lives (Oemar, 2001). Education must be able to provide alternatives through strategies and concepts based on the use of diversity in society, such as religion, culture, language, ethnic diversity, ability, race, and age (Hisnuddin & Suwahyu, 2018). The importance of education is also explained in QS. Al-Mujadilah: 11 which reads:

يَٰٓأَيُّهَا الَّذِينَ اٰمَنُوٓا اِذَا قِيْلَ لَكُمْ تَفَسَّحُوْا فِى الْمَجٰلِسِ فَافْسَحُوْا يَفْسَحِ اللّٰهُ لَكُمْۚ وَاِذَا قِيْلَ انْشُزُوْا فَانْشُزُوْا يَرْفَعِ اللّٰهُ الَّذِينَ اٰمَنُوْا مِنْكُمْۙ وَالَّذِينَ اُوْتُوا الْعِلْمَ دَرَجٰتٍۗ وَاللّٰهُ بِمَا تَعْمَلُوْنَ خَبِيْرٌ ۝١١

Meaning:
"O you who believe! When it is said to you, "Give room in the assemblies", then make room, surely God will give you room. And when it is said, "Stand up", then stand up, surely Allah will raise (rank) those who believe among you and those who are given knowledge to some degrees and Allah is All-Aware of what you do."

Indonesia currently still has a very low quality education system so that the quality of education in Indonesia is far behind by other countries, especially ASEAN members such as Singapore, Malaysia, Thailand and the Philippines. Indonesia is ranked 65th out of 130 countries based on data from the Global Human Capital Report published by the World Economic Forum in 2017 (Fieka, 2019). Learning is a system that is interrelated or integrated and is a system in the learning process. The learning system, of course, cannot be separated from and is closely related to components to support learning. The components that support learning consist of five, namely: objectives, methods, media, and learning evaluation. Learning is closely related to technological developments. Technological developments such as computers can be a medium to support teachers in implementing their learning media which will become media that act as tools and also materials containing messages that will help achieve effective learning goals (Wiratama, 2020).

Indonesia has previously been faced with a complicated problem regarding the Corona Virus Disease (COVID-19) pandemic. COVID-19, which was discovered in Wuhan, China in December 2019, is one of the viruses from the large family of SARS diseases. This virus has a negative impact on various fields, one of which is in the field of education which has caused the Indonesian education system to decline. The Indonesian government has made great efforts to control the transmission and spread of the COVID-19 virus, one of which is in the education sector. Closing schools to colleges and requiring students and students to study at home. Online learning requires that students who usually study in class must now study at home by utilizing advances in information technology so that students continue to gain knowledge like in class (Marlin, 2020).

Indonesia has now entered the new normal era so that schools and universities have been allowed by the government to implement normal learning as usual. However, this does not restore the enthusiasm of students to learn after the COVID-19 pandemic, which requires them to study online with monotonous learning models and methods so that students are bored and no longer enthusiastic about learning. This resulted in decreased student achievement and teachers had difficulty choosing innovative learning models so that not a few schools experienced difficulties in the learning process. Based on the results of interviews with Mrs. Irhayana Halim, S.Pd, M.Pd as a class XI Biology teacher at SMA Negeri 9 Sinjai, the learning process at the school has become ineffective because the achievements and enthusiasm of students have decreased since the pandemic period, especially in Biology subjects. Biology is a difficult subject to understand because some of the material is abstract and difficult for students to understand, such as the human circulatory system. Therefore, educators need appropriate learning media. This research will apply a blended learning learning system using the Flipped Classroom method as a solution at the school to overcome learning system problems, especially in the subject of Biology, the material of the human circulatory system.

A good learning process requires the right media, such as media to support E-learning, it will require appropriate and appropriate learning methods. Flipped classroom is an appropriate learning method. Flipped classroom learning method or reversed class is a learning method that is usually or generally only learned and done in class, now it can also be studied and done at home. This method is able to train students' skills intensively because students can do it many times both at home and outside the home or anytime and anywhere. Teachers will still be able to supervise and also monitor students in learning

forums that are supported by online platforms that have been prepared by applications or websites (Wiratama, 2020).

This research is intended to re-examine the research that has been done Darmawan et al. (2020) where the results of their research indicate that there is a significant influence on the learning outcomes of students who apply the blended learning model based on the flipped classroom.

Materials and Methods

Research is a quasi-experimental design, meaning that there are two groups of classes, namely the control class and the experimental class. The research design used is the pretest - posttest control led group. This research was conducted at SMA Negeri 9 Sinjai which is located on Pendidikan Street, Mannanti, Tellu Limpoe Sub-District, Sinjai Regency, South Sulawesi in August-September 2022. The population in this study were all students of class XI SMA Negeri 9 Sinjai totaling 111 students while the sample in this study consisted of 2 classes, namely class XI IPA 1 as the experimental class and class XI IPA 2 as the control class as a whole amounted to 56 students. The sampling technique in this study is random sampling using a spin wheel so that the experimental class is obtained, namely class XI IPA 1 and the control class is class XI IPA 2.

The data collection technique was carried out in the form of data collection by giving tests given to students twice in the form of multiple choice questions as many as 25 numbers. The first test or pretest is given before applying Blended learning with the flipped classroom method in the control and experimental classes to determine the students' initial knowledge, then the second test or posttest is given after applying blended learning with the flipped classroom method in the experimental class and in the control class. who were not given treatment.

This study uses data analysis techniques in the form of descriptive statistics and inferential statistics consisting of normality test, homogeneity test, and hypothesis testing t-test (independent t-test). Testing and data analysis using the Statistical Product and Service Solution software program (SPSS version 25). Data were analyzed with a significance value of 0.05 and a 95% confidence level. The category of student learning outcomes can be seen in the following table (Rahmat, 2019).

Table 1. Category of learning outcomes

Range Score	Result Category Study
0 - 32	Very low
33 - 49	Low
50 - 66	Currently
67 - 83	Tall
84 - 100	Very high

Result and Discussion
A. Descriptive Analysis

Descriptive analysis of student learning outcomes in the control class and the experimental class, then the data obtained from the instrument in the form of learning outcomes tests were carried out twice, namely pretest and posttest given before treatment and after treatment can be seen in Table 2.

Table 2. Data analysis of pretest and posttest

Data	Pretest Results		Posttest Results	
	Control Class	Experiment Class	Control Class	Experiment Class
Mean	45.43	45.71	72.04	89.21
Minimum Value	7 0	70	86	100
Maximum Value	20	26	60	80
Standard Deviation	14,620	12,593	8,217	5,776
Variance	219,958	158,582	67,517	33,360

This research is an experimental study that aims to determine the effect of the application of blended learning with the flipped classroom method on student learning outcomes. The percentage of learning outcomes taught by applying the Blended Learning learning model with the flipped classroom method based on the range of learning outcomes test scores. Based on these categories, it shows that there are 6

students in the 67-83 grade range in the high category with a percentage of 21%, and there are 22 students in the 84-100 score range in the very high category with a percentage of 78%. From these data, it is known that the learning outcomes of students who use the Blended Learning learning model with the Flipped Classroom method are dominant in the very high category. Meanwhile, the percentage of learning outcomes taught using conventional learning models is categorized based on the range of learning outcomes test scores. Based on these categories, it shows that there are 10 students in the 50-66 grade range in the medium category with a percentage of 35%, 15 students in the 67-83 grade range in the high category with a percentage of 53% and 3 students in the grade range 84-100 in the very high category with a percentage of 10%. From these data, it is known that the learning outcomes of students who do not use the Blended Learning learning model with the Flipped Classroom method are dominant in the high category.

B. Inferential Analysis

Inferential statistical analysis was carried out to determine whether there was an effect of the blended learning model with the flipped classroom method on student learning outcomes in the experimental class (XI IPA 1) and control class (XI IPA 2) by looking at the posttest data obtained in the experimental class and class. Controls were tested 3 times, namely normality test, homogeneity test, and hypothesis testing (t-test) as follows:

1. Normality test

Normality test in this study was carried out using Kolmogorov Smirnov with the provision that the conclusion of the sign normality test > 0.05 _ then the data is normally distributed and if sign < 0.05 then the data is not normally distributed. The results of the normality test can be seen in Table 3.

Table 3. Normality test results of learning outcomes

| Class | Kolmogorov Smirnov | | | Information |
	Statistics	df	Sign	
Pretest experiment	0.124	28	0 ,200	
Posttest experiment	0.124	28	0. 200	Normal Distribution
Pretest control	0.154	28	0.086	
Posttest control	0.126	28	0.200	

Table 3 proves that the data has been normally distributed with a significance value of 0.200 in the experimental class pretest and posttest, a significance value of 0.086 in the control class pretest and a significance value of 0.200 in the control class posttest.

2. Homogeneity test

The homogeneity test was conducted to determine whether the variance of the two samples used was taken from a uniform population or vice versa. The criteria for taking the conclusion of the homogeneity test are if the sign value> 0.05 then the population data has a homogeneous variance and if the sign value <0.05 then the population data has a non-homogeneous variance. The results of the normality test can be seen in Table 4.

Table 4. Results of homogeneity test for experimental and control classes

Levene Statistics	Df1	Df2	Sign	Information
2.471	1	53	0.122	Homogeneous

Table 4 shows that the sign value > 0.05, which is 0.122, then the data above is equivalent or homogeneous.

3. Hypothesis testing

After the data obtained indicate that the distribution is normal and homogeneous, then the data is then reprocessed to test the hypothesis that has been formulated in this study. Hypothesis testing was carried out using the t-test (t-test) technique. The decision-making criteria are as follows: (a) If the significant value is > $_{0.05}$ then H0 is accepted or "there is no significant effect on the application of Blended Learning with the Flipped Classroom method. On the learning outcomes of class students at SMAN 9

Sinjai"; (b) If the significant value is < 0.05, then H1 is accepted or "there is ₐ significant effect on the application of Blended Learning with the Flipped Classroom method on student learning outcomes at SMAN 9 Sinjai". Hypothesis testing of student learning outcomes data was analyzed by using a t-test on an independent sample (independent sample t-test) as for the hypothesis shown in Table 5.

Tabel 5. Hypothesis testing of learning outcomes data

	Levene's Test for Equility of variances		t-test for Equility of Means		
	F	*Sign*	T	Df	*Sign* (2tailed)
Equal variances assumed	2.471	0.122	7.648	53	0.000
Equal variances non assumed			7.629	51.400	0.000

Based on the Table 5, it can be seen that the significant value in the hypothetical test using the Stasistical Product and Service Solution (SPSS version 25) software program, obtained the sign value (2-tailed) = 0.000. So that the hypothesis in this study can be said to be proven because 0.000 < from 0.05 or by looking at the t count of $_{7.648}$ while the t $_{table}$ of 2.018 thus t $_{h\,count}$ > t $_{table}$. This means that there is a significant difference between the learning outcomes of students who are taught by applying the blended learning learning model with the flipped classroom method and students who are taught without applying the Blended Learning learning model using the flipped classroom method. This shows that there is a significant effect of applying the blended learning learning model with the flipped classroom method on the learning outcomes of biology teaching materials for class XI SMA Negeri 9 Sinjai.

The high learning outcomes of students who are taught by applying the Blended Learning learning model with the Flipped Classroom method are due to the fact that students are actively involved from the beginning to the end of the learning process. As the name implies flipped classroom which means the class is reversed, it means a model that reverses habits in traditional learning, which requires students to learn the material at home first before doing direct learning in class and will provide new experiences for students where in learning face-to-face discussions of tasks that make students active during learning take place . While the learning outcomes of students who are taught by applying conventional learning models are in the high category. This is because in the application of conventional learning models, the delivery of the material is still done by way of educators delivering subject matter then students only listen and in this learning process the teacher acts as an information center so that learning does not take place in a multi-directional manner which results in a lack of interaction between students and has an impact on the learning process.

According to Kurniawati et al. (2019), application of the blended learning model with the flipped classroom method has a positive influence on students. By providing learning materials and videos containing learning materials, it also helps students learn the material independently at home while at the same time being able to adjust their own learning speed because they have the opportunity to repeat the material if needed anywhere and anytime which can be accessed via a computer/computer. Laptops, smartphones and tablets.

The significant difference between the learning outcomes of the experimental class and the control class is due to the application of the blended learning learning model with the flipped classroom method which requires students to be more active and collect information from various sources, interact with each other in study groups to discuss assignments given by educators. Meanwhile, in the application of conventional learning models, the information or material obtained by students is only obtained from educators. Educators explain the material and give assignments while students only listen to the delivery related to the material being studied and work on the LKPD (student worksheet) that is given so that learning outcomes by applying this model are not optimal.

According to Darmawan et al. (2020) stated that the application of the blended learning model based flipped classroom is effectively used to improve student learning outcomes. In general, it can be concluded that the blended learning model based flipped classroom has a significant effect on improving

student learning outcomes compared to students who receive conventional learning. This research proves that there is a positive influence on learning by applying the blended learning model with the flipped classroom method on the learning outcomes of students at SMA Negeri 9 Sinjai. It can be seen from the results of descriptive statistical analysis and inferential statistical analysis using the Statistical Product and Service Solution (SPSS version 25) software program where there is a significant difference between the learning outcomes of students who are taught by applying the blended learning learning model with the flipped classroom method and students who are taught without applying the blended learning learning model with the flipped classroom method.

Conclusion

Learning outcomes of class XI IPA 1 students on the material of the human circulatory system taught by applying the blended learning model with the flipped classroom method at SMA Negeri 9 Sinjai experienced a significant increase in the average value from 45.71 to 89.21 with a very high category. Meanwhile, the learning outcomes of class XI IPA 2 students on the material of the human circulatory system taught without applying the blended learning model with the flipped classroom method at SMA 9 Sinjai experienced a significant increase in the average value from 45.43 to 72.04 in the high category. So, there is an effect of the application of the flipped classroom learning model on student learning outcomes. This is evidenced by the hypothesis testing obtained, namely $t_{count} > t_{table}$ (7.648 > 2.018). Thus H0 is rejected and H1 is accepted at a significant level of 5% ($\alpha = 0.05$). This shows that there is a significant influence on the application of the blended learning model with the flipped classroom method on the learning outcomes of students in class XI IPA 1 on the material of the human blood circulation system at SMA Negeri 9 Sinjai.

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