International Journal of Education and Social Science Research

ISSN 2581-5148

Vol. 2, No. 06; 2019

EFFECTIVENESS OF USE OF PICTORIAL BIOLOGY MATERIAL OF KINGDOM PLANTAE IN IMPROVING STUDENTS' LEARNING ACHIEVEMENTS IN SMAN 3 BOLO

Mardiana, Muhammad Akhyar and Akhmad Arif Musadad
Postgraduate Program, Educational Technology Study Program Sebelas Maret University
Jl. Ir Sutami No. 36A, Surakarta, Central Java, Indonesia

ABSTRACT

This research aims to examine the effectiveness of the pictorial biology teaching material on Kingdom plantae to improve students' learning achievements at SMA Negeri 3 Bolo. The research method used was experimental research with two classes as the sample, an experimental class and a control class. The effectiveness was measured by the results of the N- Gain Score test which were analyzed with the independent sample t-test. The calculation results of the N-Gain Score test show that the average N-Gain score for the experimental class (pictorial biology teaching material) is 72.5% of the quite effective category with a minimum N-Gain score of 57.45% and a maximum of 90.6%. Meanwhile the average N-Gain score of the control class (ordinary textbook) is 47.6% of the very ineffective category with a minimum N-Gain score of 20.45% and a maximum of 70.00%. The results of the t-test analysis shows that there is a significant difference between the class using pictorial biology teaching materials and the other not using with a sig (2-tailed) value of 0.000 < 0.05 or t of 9.003 compared to the t_{table} of 1.729 (significance level of 5%). Thus, $t > t_{table}$ or 9.003 > 1729. It implies that the pictorial biology teaching materials in the kingdom plantae material are effective enough to improve the students' learning achievements at SMAN 3 Bolo.

KEYWORDS: Pictorial Biology Teaching Material, Kingdom Plantae, Learning Achievement.

INTRODUCTION

Learning activities in schools greatly affect students' learning achievements. Effective learning is influenced by several factors, one of which is the media. According to Arsyad (2011), learning media is an intermediary that carries messages or information that is instructional or contains teaching purposes. This is in line with the statement of Angkowo (2007) that media is everything that can be used to deliver messages, stimulate the mind, attention and willingness of students, so they can be involved in the learning process. Many media are used by teachers in the learning process, one of which is printed media. Teaching materials is one of the printed media used by the teacher to help students in the learning process. Therefore, a teacher must be able to choose the right teaching material as a learning resource that is adjusted to the needs of students.

According to the Ministry of National Education, the purposes of making teaching materials are to provide the materials in accordance with the demands of the curriculum by considering the needs of

ISSN 2581-5148

Vol. 2, No. 06; 2019

students Teaching materials should be in accordance with the characteristics and settings or social environment of students, helping students in obtaining alternative teaching materials in addition to textbooks that are sometimes difficult to obtain, and facilitating teachers to carry out learning (Ministry of National Education, 2008). Learning oriented to the needs of students is the main concern nowadays, especially in biology. According to Relsas Yogica (2014), biology learning is learning that is full of facts, concepts, principles and theories. Therefore, biology is one of the subjects that requires teachers to be able to develop teaching materials from the surrounding environment. This is because there are many biological concepts that can utilize events and components in the surrounding environment as a source of learning (Rozalia Anifah, 2018).

Besides, biology learning is full of pictures to explain the structure and process. Without pictures, biology will not provide a good understanding for the students. So far, the teacher and students ignore the pictures, so biology learning is considered abstract. Information obtained from the experience of hearing and seeing is very meaningful in communication as stated by Edgar Dale that 75% of learning experiences are obtained through the sense of sight, 13% through the sense of hearing and 12% through other senses (Arsyad: 2011). Biology learning materials are full of visualized objects and concepts that have a hierarchical nature (Lufri, 2007). The use of pictorial teaching materials in biology learning is one of the solutions related to students' learning interests, motivations and achievements. The use of appropriate media will help increase students' attention to certain topics especially the material related to the world of plants. With the help of pictorial teaching materials, students are more enthusiastic in the learning process, so in the end their learning achievements also increase.

Therefore, according to Lufri (2007), biology learning requires visualization to improve students' understanding. This understanding will be more useful if students develop their own concepts. From the results of the preliminary research through direct observation and interviews with biology subject teachers in class X SMA Negeri 3 Bolo, it can be concluded that the biology learning process so far only uses teaching materials in the form of biology textbooks with very limited numbers compared to the number of students. On the other hand, based on the information from biology subject teachers, 70% of students have very low achievements and have not yet reached the threshold, specifically on Kingdom Plantae material. Kingdom plantae material is one of the biology subject matters of the tenth grade in the second semester and covers the world of plants. On the other hand, based on the information of some students, learning is only in the classroom using the lecture method and textbooks as the main teaching materials. This results in a lack of student understanding of the Kingdom plantae material.

The students' low learning achievements are the big responsibility for the teachers. According to Mardiana (2019), such problem requires the development of innovative teaching materials to support a good learning process. The Department of National Education (2008) states that the selection and determination of good teaching materials must meet one of the criteria that teaching materials must

ISSN 2581-5148

Vol. 2, No. 06; 2019

be interesting and can help students to achieve competence. Thus, teaching materials are made according to the needs and suitability with the basic competencies to be achieved. The type and form of teaching materials are determined based on analyses of the curriculum and the source of the previous material. This is reinforced by Relsas Yogica (2014) that teaching materials created must be able to accompany the differences in the learning skills of each student because, in a class, there are usually fast learners and slow ones. To overcome this, individual teaching materials are needed.

Slameto (2010) state that the accuracy of teaching materials used in the learning process will facilitate the reception of the subject matter provided. If students easily accept the subject matter and master it, then they will learn harder and progress. Therefore, we need a media in the form of pictorial teaching materials that can facilitate learning, so students are enthusiastic in following the lessons. Rohani (1997) mentioned that learning with pictures is very important to clarify understanding to students, so by using pictures, students will pay more attention to objects or things they have never seen relating to learning. Elpitriani (2012) state that good visualization will increase students' understanding with respect to the subject matter. This is in line with the research by Abrori (2011) concluding that pictures will have a positive effect on improving students' learning achievements. Thus, this teaching material aims to help students understand the material and improve their learning achievements in the biology subject, specifically the Kingdom plantae material. The results of this research are expected to be utilized and applied by biology teachers in the learning process in schools, making it easier for students to understand biological concepts in the material being studied and inputs for principals to encourage their teachers to write teaching materials.

B. METHOD

The population in this research were the tenth-grade students of SMAN 3 Bolo in the 2018/2019 academic year. Each class consisted of 19 students. The research sample was selected from the population resulting in class Xa as the experimental class and class Xb as the control class. Treatment was done 5 times, three times to implement pictorial biology teaching materials and 2 times for the pretest and posttest to the experimental and control groups. The research design used was a Quasi Experimental Design in the form of "pretest and posttest". The formula used in this Quasi Experimental Design is as follows:

Table 1. Quasi Experimental Design

Group	Pretest	Treatment	Posttest
Experiment (KE)	$\mathbf{O_1}$	X	$\mathbf{O_1}$
Control (KK)	$\mathbf{O_2}$	-	$\mathbf{O_2}$

O_1 : Pretest and Posttest of Experimental Group O_2 : Pretest and Posttest ofControl Group

ISSN 2581-5148

Vol. 2, No. 06; 2019

X : Experimental Group Treatment

The table shows that there are two groups in this research, the experimental group and the control group. The experimental group used pictorial biology teaching materials, but the control group did not use. Some stages for program validation include: (1) giving pretest to determine the initial ability of the two classes. The results of this test is used as a consideration to see an increase in mastery of the new teaching material and students' learning achievements before and after learning; (2) implementing learning by using hypothetical biology teaching material models that have been made; and (3) evaluating each lesson at the end of the activity. The results of the evaluation are used to measure the extent to which the effectiveness of pictorial biology teaching materials can improve students' learning achievements in SMAN 3 Bolo. The effectiveness test of pictorial biology teaching materials on the Kingdom plantae material was carried out using N-Gain score. N-Gain score aims to determine the effectiveness of the use of teaching materials in the experimental class and the control class. In addition, it is also to find out the difference in the mean score of the experimental class and the control class in improving students' learning achievements. The effectiveness of teaching materials is measured by the results of the N-Gain Score test, which is analyzed with the independent sample t-test. The effectiveness categories for the N-Gain Scores are as follows:

Table 2. Effectiveness Category of N-Gain Score

Percentage (%)	Interpretation
< 40	Ineffective
40-55	Less Effective
56-75	Effective Enough
> 76	Effective

Source: (Hake, R.R, 1999)

The formula for calculating the N-Gain Score is as follows: N-Gain = Posttest Score – Pretest Score

Ideal Score - Pretest Score

C. RESULT AND DISCUSSION

I. Study Result

The effectiveness test of pictorial biology teaching materials was carried out on two classes, namely the experimental class and the control class. The experimental class used pictorial biology teaching materials in the learning process while the control class used textbooks that are commonly used by the teacher in the learning process. For more details, look at the results of the descriptive analysis as follows.

ISSN 2581-5148

Vol. 2, No. 06; 2019

Table 3 Descriptive Analysis of Pretest and Posttest of Experimental and Control Groups

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pretest Experiment	19	26	60	45.16	8.995
Posttest Experiment	19	80	95	85.26	4.370
Pretest Control	19	30	60	48.47	8.242
Posttest Control	19	60	80	68.89	6.402
Valid N (listwise) 19					

Based on Table 3 of the descriptive analysis, it can be concluded that mean score of the experimental class pretest before the applying pictorial biology teaching materials is 45.16 with a maximum score of 60 and a minimum of 26 while the mean score of the posttest is 85.26 with a maximum Score of 95 and a minimum of 80. It can be concluded that there is an increase in the learning achievements before and after the application of pictorial biology teaching materials in the kingdom plantae material. Then, the pretest mean score of the control class is 48.47 with a maximum score of 60 and a minimum of 30 and its posttest mean score is 68.89 with a maximum score of 80 and a minimum of 60. Therefore, referring to the N- Gain Scores in the form of % and the descriptive output table, we can make a table of the N- Gain Score test results below. The following are the results of the calculation of N-Gain scores in the form of %.

Table 4. N-Gain Score Calculation Result

	Experimental Class		**Control Class**
No	**N-Gain Score (%)**	**No**	**N-Gain Score (%)**
1	84.00	1	48.84
2	73.68	2	60.00
3	90.57	3	60.94
4	69.77	4	70.00
5	64.00	5	41.67
6	70.00	6	68.09
7	63.83	7	37.50
8	80.60	8	40.43
9	70.31	9	30.00
10	66.04	10	60.00
11	80.00	11	53.70
12	71.70	12	45.31

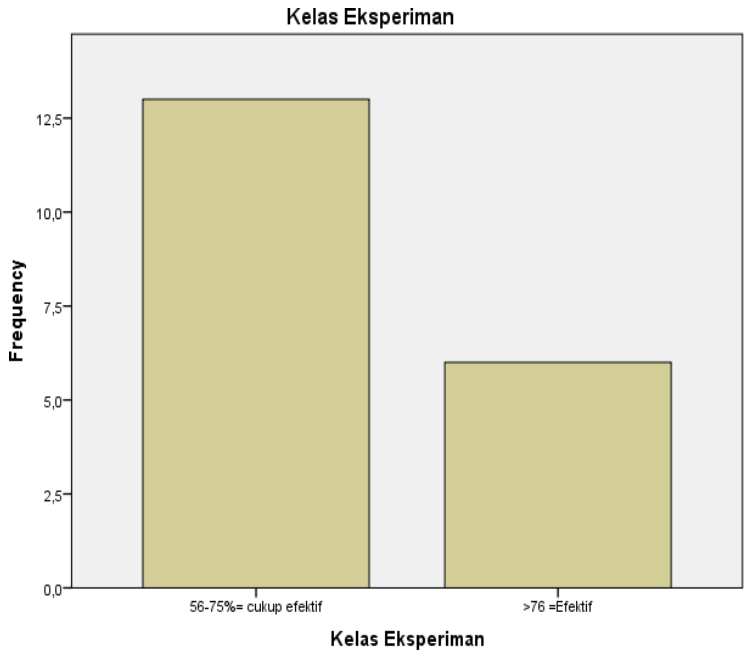
ISSN 2581-5148

Vol. 2, No. 06; 2019

13	57.45	13	41.86
14	71.43	14	30.23
15	85.14	15	47.17
16	62.50	16	50.00
17	64.91	17	20.45
18	70.00	18	47.37
19	82.46	19	50.00
Mean	**72.5 %**	**Mean**	**47.55 %**
Minimum	**57.45 %**	**Minimum**	**20.45 %**
Maximum	**90.6%**	**Maximum**	**70.00 %**

Based on the calculation results of the N-Gain scores above, the mean N-Gain score of the experimental class (pictorial biology teaching material) is 72.5% of the quite effective category with a minimum score of 57.45% and a maximum of 90.6%. The mean N-Gain score of the control class is 47.55% of the ineffective category with a minimum score of 20.45% and a maximum of 70.00%. It can be concluded that the use of pictorial biology teaching materials on the kingdom plantae material by using a contextual approach is quite effective to improve students' learning achievements at SMAN 3 Bolo. For more details, see the frequency table below.

Table 5 Frequency



Based on the statistical outputs in the picture, there are 13 or 68.4% of students who get a Gain Score of 56-75%, which means quite effective while other 6 or 31.6% of students get scores > 76% or in the effective category. After we know the effectiveness of using pictorial biology teaching materials in the experimental group on students' learning achievements, we will compare whether there are significant differences related to the effectiveness of the use of pictorial biology teaching materials on kingdom plantae material to improve students' learning achievements at SMAN 3 Bolo using an independent t-test for the N-Gain scores (%). The requirement that must be met before conducting the t-test is that the data must be normally distributed and homogeneous. Then, before the t-test, the posttest scores of the experimental class and control class are tested for their normality and homogeneity.

a) Normality Test

Based on the results of the statistical test with SPSS 20 program, it indicates that the data normally distributed if the significance value is greater than 0.05. The significance posttest value of the experimental class is 0.454 and the control class 0.593. Then, it can be concluded that the posttest scores of the experimental class and the control class are normally distributed.

Table 6. Normality Test

Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Experimenta NGain_Percent l	.169	19	.155	.954	19	.454
Control	.148	19	.200*	.958	19	.539
*. This is a lower bound of the true significance.						
a. Lilliefors Significance Correction						

b) Homogeneity Test

Table 7. Homogeneity Test of Posttest Variances Experimental and Control

Ngain_Percent			
Levene Statistic	**df1**	**df2**	**Sig.**
1.772	1	36	0.192

The statistical calculation shows that the data are homogeneous if the significance value is greater than 0.05. Based on the results of the statistical test, the homogeneity test significance value is 0.192 > 0.05, which means that the N-Gain score (%) data variance of the experimental class and control class data is homogeneous

c) T-Test

Table 8. Group Statistics

Class	N	Mean	Std. Deviation	Std. Error Mean
NGain_Percen t Experimental	19	72.5459	8.94575	2.05230
Control	19	38.7680	13.69090	3.14091

Based on the statistical group output table above, it is known that the mean score of Ngain_percent for the experimental class is 72.5459 or 72.5%. Based on the interpretation of the effectiveness category of the N-Gain score, it can be concluded that the use of pictorial biology teaching materials is effective to improve students' learning achievements. Furthermore, it is known that the mean score of Ngain_Percent of the control class is 38.7680 or 38.8. Based on the effectiveness category of the N-Gain score, it can be concluded that conventional teaching materials are not effective in improving students' learning achievements. To find out the difference in effectiveness of the two teaching materials, see the table below.

Table 9. Independent Samples Test

Levene's Test for Equality of Variances		**t-test for Equality of Means**	
F	Sig.	T	Sig.(2-tailed)
1.772	0.192	9.003	0.000

Based on the independent sample t-test output table above, it is known that the value of sig, (2-tailed) is 0.00 < 0.05, meaning that there is a significant difference in effectiveness between the use of pictorial biology teaching materials and the main teaching materials in improving students' learning achievements in SMAN 3 Bolo. If using the coefficient criterion t greater than the coefficient t_{table}, the value of t is 9.003 compared to t_{table} of 1.729 (significance level of 5%). Thus, $t > t_{table}$ or 9.003 > 1.729. Thus, the pictorial biology teaching material in the kingdom plantae material through a contextual approach is quite effective in improving students' learning achievements at SMAN 3 Bolo.

2. DISCUSSION

The use of the pictorial biology teaching material in the kingdom plantae material effectively improves the students' learning achievements at SMAN 3 Bolo. This is in line with the research conducted by Relsas Yogica (2014) showing that the use of pictorial media is effective in improving students' thinking skills. With this concept, the learning achievements are expected to be more meaningful for students. The learning process takes place naturally in the form of activities of students who work and experience instead of transferring knowledge from the teacher to the

ISSN 2581-5148

Vol. 2, No. 06; 2019

students. Learning strategies are more important than the results (Elaine, 2007). According to Meiriza Suswina (2011), in biology learning, the application of learning strategies using pictorial teaching materials accompanied by concept maps is thought to help conceptual understanding for students to receive the lesson quickly and are the materials to be easily digested and remembered. There are many ways that can be done to develop teaching materials into such a way. One of them is by picture-based teaching materials. The presentation of the materials with more interesting images that will make students more enthusiastic to follow the learning process. According to Davies in Chairil (2009), there are several reasons of why pictures are widely used when we try to convey something, including when we develop a handout.

1. Pictures can be a decoration that makes teaching materials more attractive. It means that pictures that function as decorations can make teaching materials more interesting. Because teaching materials attract the attention of students, boredom that might arise in students can also be overcome.
2. With pictures, we can simplify the way of conveying the concept without reducing its meaning.
3. Pictures can motivate. Pictures (if selected correctly) can be used to motivate students to learn and keep learning. With pictures, the information to be conveyed can be more clearly understood because narrative information is often inadequate.

Thus, picture media are very effective in the learning process.

D. CONCLUSION

Based on the results of the research and discussion, it can be concluded that the pictorial biology teaching material in the kingdom plantae material effectively improves students' learning achievements at SMAN 3 Bolo. This research also provides an overview and input to all parties to continue to improve the quality of learning, especially in the biology subject. The developed teaching materials can create a fun learning atmosphere and produce satisfying learning achievements in accordance with the threshold. The author also recommends that this pictorial biology teaching material can be used by teachers as an alternative material that as a medium in the learning process. In addition, it is suggested that teachers be more creative in developing teaching materials in the form of difficult materials for students to understand.

E. REFERENCE

Abrori, Saiful. (2011). Pengaruh Penggunaan Multimedia dan Media Gambar Terhadap Hasil Belajar Siswa SD. Karya Tulis Pendidikan Guru Sekolah Dasar Fakultas Keguruan Ilmu Pendidikan Universitas Negeri Surakarta.

Angkowo, R. and A. Kokasih. 2007. Optimalisasi Media Pembelajaran. Jakarta: Grasindo. Arsyad, A. 2011. Learning Media. Jakarta: PT Rineka Cipta.

Chairil. 2009. Media Pembelajaran. (Online). http://chai-chairil.pdf

Depdiknas (2008). Panduan Pengembangan Bahan Ajar. Jakarta: Direktorat Jenderal Manajemen Pendidikan Dasar dan Menengah.

ISSN 2581-5148

Vol. 2, No. 06; 2019

Elpitriani. (2012). Pengembangan Modul Pembelajaran Biologi Berorientasi Konstruktivisme Dilengkapi Mind Map pada Materi Sistem Ekskresi Untuk Sekolah Menengah Atas. Unpublished thesis. Padang: PPs Universitas Negeri Padang.

Lufri, (2007). Strategi Pembelajaran Biologi. Padang: UNP Press.

Lufri, (2007. Kiat Memahami Metodologi Melakukan Penelitian. Padang: Universitas Negeri Padang

Mardiana, M Akhyar, A.A Musadad. (2019). Analisis kebutuhan siswa di SMA Negeri 3 Bolo Terhadap Bahan Ajar Bergambar Pada Materi Kingdom plantae. Proceeding of the ICECRS.Vol. 2 :1 2019

Meiriza Suswina (2011). Hasil Validitas Pengembangan Bahan Ajar Bergambar Disertai Peta Konsep Untuk Pembelajaran Biologi Sma Semester 1 Kelas XI. Jurnal Ta'dib, Volume 14, No. 1 (June 2011)

Relsas, Yogica (2014). Efektifitas Modul Bergambar Disertai Lks Berorientasi Konstruktivistik Terhadap Proses Dan Aktivitas Belajar Siswa Dalam Pembelajaran Biologi Sma.Jurnal Penelitian Pendidikan Volume 5, No. 1, January 2014

Rohani, Ahmad. (1997). Media Instruksional Edukatif. Jakarta: Rineka Cipta.

Rozalia Anifah, Kasrina, Irwandi Ansori. (2018) Pengembangan Handout Biologi Materi Keanekaragaman Hayati Untuk SMA Kelas X. Jurnal Pendidikan dan Pembelajaran Biologi Vol. 2:2 2018.