

The Effect of *Discovery Learning* Model Assisted by *Liveworksheet* on Biology Learning Independence of Class XI SMA

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Abstract: *This research is a quasi-experimental research that aims to determine the effect of discovery learning model assisted by liveworksheets on the independence of biology learning of high school class XI students. The population in this study were all students of class XI MIPA SMAN 14 Makassar. The research sample was selected randomly (random sampling) so that two classes were obtained, namely class XI MIPA 6 as an experimental class that used the discovery learning model assisted by liveworksheets and class XI MIPA 1 as a control class with 33 students each. Data collection was carried out by giving a questionnaire of learning independence as many as 30 statement items with four answer choices. Data were analyzed by descriptive statistics and inferential statistics. The results of descriptive statistical analysis showed that the average value of the posttest in the experimental class was 86.09 higher than the average value of the control posttest which was 73.48. This study used covariate analysis (Anacova). Based on the results of inferential analysis obtained sig 0.001 smaller than 0.05. It can be concluded that the discovery learning model assisted by liveworksheets has an effect on the learning independence of biology students in class XI SMA.*

Keywords: *Discovery Learning, Learning Independence, Liveworksheets.*

1. INTRODUCTION

Education plays an important role in order to develop and improve the progress of a country. This is based on government policy in the National Education System Law that the need for national education standards to be prepared, one of which is the curriculum. Curriculum as a tool in achieving educational goals as well as a guide to the implementation of the learning process at all levels of education in improving the quality of students' potential. As stated in the Ministry of Education and Culture (2012) that the curriculum is the most important basis for producing quality human beings who are able to answer the challenges of an ever-changing and proactive era, educated human beings who are faithful and

devoted to God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and democratic and responsible citizens ([Makaborang, 2019](#)).

The theme of K13 development is a curriculum that can form productive, creative, innovative, effective humans through strengthening attitudes, skills and integrated knowledge ([Simandjuntak, 2020](#)). The demands of the 2013 curriculum state that biology learning is more emphasized on increasing the active role of students. Biology learning requires students to be able to understand, apply, analyze conceptual and procedural knowledge.

Problems in learning are caused by many things, one of which is the low level of learning

independence of students. It can be caused by several factors including teachers, students, and learning models or media. The teacher's way of teaching that is less interesting is one of the factors that can affect learning independence. The lack of variety of teachers in applying learning strategies along with the frequent use of conventional methods causes students to experience boredom, resulting in a lack of enthusiasm for learning. In addition, students are also given less opportunity to participate during the learning process. Another factor that affects learning independence is learning media. The lack of learning media also hinders the learning process of students. Less attractive learning media will make students bored and bored quickly in following the learning process in class so that learning independence is lacking.

Biology lessons tend to be rote, causing students to have difficulty understanding biology lessons, because basically studying biology is not by memorizing all aspects of the material, but by understanding the concepts in it (Azizah & Heffi, 2021). The memorizing biology learning process requires a discovery-based learning strategy, thus supporting learning by using the *discovery learning* model with the use of LKPD that is in line with the strategy used, namely using discovery-based LKPD (Bahri et al., 2017). In line with Ramdani et al (2017), the learning model that can be used as a solution to these problems is *discovery learning*. The advantage of the *discovery learning* model is a model that can make students learn actively by finding themselves and investigating themselves, so that the results obtained will last long in memory and are not easily forgotten by students. With this technique, the teacher's role is only to guide and provide instructions (Astuti et al., 2018). *Discovery learning* innovative learning tools to make the learning process more effective. One of the learning tools that is very important in increasing learning independence is student worksheets.

Learner worksheets (LKPD) include teaching materials that have complete components with a concise form rich in tasks to practice and guide students who are used to carry out investigation and problem solving activities (Diani et al., 2019). The LKPD used at this time is more in the form of printed LKPD in the form

of sheets. Based on this, by utilizing technology, teachers can be more creative, innovative, in creating learning to be more interesting and fun. One of the technological tools used is a cell phone that supports the presentation of audio-visual material using LKPD (Bahri et al., 2020). The advantages are easy to use, practical and have various elements that can make LKPD more interesting, such as containing learning video link material, audio and various other elements. Therefore, *liveworksheets* become a tool in the application of the *discovery learning* model in order to increase students' learning independence.

2. RESEARCH METHODS

This type of research is a *quasi experiment* that has an experimental group (treatment) and a control group. It was carried out at SMA Negeri 14 Makassar in the odd semester of the 2023 academic year with animal tissue material in class XI SMA.

The design of this study was *pretest-postest Control Group Design* consisting of two groups, both of which were determined *randomly (random sampling)*. The research design can be seen in Table 1.

Table 1. Research Design

Group	Pre-test	Treatment	Post-test
Eksperiment Class	O ₁	X	O ₂
Control Class	O ₃	-	O ₄

Source: (Asdar, 2018)

Description:

O1 = *Pretest* of experimental class

O2 = *Posttest* of experimental class

O3 = *Pretest* of control class

O4 = *Posttest* of control class

X = *Discovery learning* model assisted by *liveworksheets*

- = *Direct learning* model with printed LKPD

The classes selected in the study were XI MIPA 6 as the experimental class and XI MIPA 1 class as the control class, each consisting of 33 students. Students' learning independence is measured through non-test assessment using a questionnaire which is first validated by an expert validator. The questionnaire sheet is in the form of a *checklist* with a total of 30 statements that refer

to indicators of learning independence, namely self-confidence, responsibility, initiative, and discipline. Where the scoring guidelines are adapted from the *Likert Scale* (four scales) strongly agree, agree, disagree and strongly disagree.

The data obtained on learning independence were then analyzed using two ways, namely descriptive and inferential statistical analysis. The data were analyzed descriptively based on the questionnaire results which were calculated using the following formula.

$$\text{Value} = \frac{\text{Sum of the Scores Obtained}}{\text{Maximum Sum of Scores}} \times 100$$

After scoring, the questionnaire data on students' learning independence is grouped based on the following criteria.

Table 2. Learning Independence Categories

Value	Criteria
0 - 39	Extremely low
40 - 59	Low
60 - 74	Medium
75 - 84	High
85 - 100	Extremely High

Source: [\(Lestari & Mokhammad, 2018\)](#)

Before inferential statistical analysis, normality and homogeneity tests were first carried out to find out whether the data were distributed normally and homogeneously. The normality test in this study used *Kolmogorov-Smirnov*, while the *homogeneity* test used the *homogeneity of variances test* with the help of the SPSS program. Hypothesis testing in this study used the *analysis of covariance (ANACOVA)* test with the *statistical package for social science (SPSS) for windows* application program at the $\alpha = 0.05$ level.

3. RESULTS AND DISCUSSION

The results of the study were obtained through data analysis by descriptive statistics and inferential statistics as follows.

Descriptive Statistical Analysis

Based on the results that have been carried out, the descriptive statistical data of students' biology learning independence can be seen in Table 3.

Table 3. Descriptive Statistics of Learners' Learning Independence

Descriptive Statistics	<i>Discovery Learning Assisted by liveworksheets</i>		Direct Learning with Printable LKPD	
	<i>Pretest</i>	<i>Posttest</i>	<i>Pretest</i>	<i>Posttest</i>
	Number of Sampel	33	33	33
Lowest Score	60	76	50	58
Highest Score	83	98	82	86
Average	72.18	86.09	69.00	73.48
Standard Deviation	6.930	5.642	8.322	7.803

Based on table 3, it can be seen that the *pretest* and *posttest* values of the independence of learning biology of animal tissue material in the class taught with the *discovery learning* model assisted by *liveworksheets* and the class taught in the form of direct learning with printed LKPD each using 33 samples. The *pretest* value in the class taught with the *discovery learning* model assisted by *liveworksheets* is almost the same as the *pretest* value in the class taught in the form of direct learning with printed LKPD which can be seen in the average *pretest* value obtained, namely in the class taught with the *discovery learning* model assisted by *liveworksheets* of 72.18 and in the class taught in the form of direct learning with printed LKPD of 69.00. However, after being given treatment in the class taught with the *discovery learning* model assisted by *liveworksheets* experienced an increase in the *posttest*, while the class taught in the form of direct learning with printed LKPD also experienced a smaller increase than the class taught with the *discovery learning* model assisted by *liveworksheets*. Therefore, the average value obtained in the class taught with the *discovery learning* model assisted by *liveworksheets* is 86.09 and the class taught in the form of direct learning with printed LKPD is 73.48.

The category of the value of students' biology learning independence is obtained as in Table 4.

Table 4. Category of Biology Learning Independence of Students

Value	Category	Discovery Learning Assisted by <i>liveworksheets</i>		Direct Learning with Printable LKPD	
		Pretest	Posttest	Pretest	Posttest
		0 - 39	Extremely low	0	0
40 - 59	Low	0	0	5	2
60 - 74	Medium	20	0	18	13
75 - 84	High	13	15	10	17
85 - 100	Extremely High	0	18	0	1
	Total	33	33	33	33

Table 4 above shows that students have good learning independence. This shows that the biology learning independence of class students who act as a class taught with the discovery learning model assisted by *liveworksheets* has increased.

The independence questionnaire used contain four indicators of learning independence consisting of confidence, responsibility, initiative, and discipline. The value of each indicator is shown in Table 5.

Table 5. Average Value of Each Indicator of Students' Learning Independence

Indicator	Discovery Learning		Category	Direct Learning		Category
	Pretest	Posttest		Pretest	Posttest	
Confidence	69,7	84,3	High	64,8	71,3	Medium
Responsibility	74,4	84,7	High	70,4	76,2	High
Initiative	71,3	88,4	Extremely High	68,4	72,1	Medium
Discipline	75,3	87,7	Extremely High	76,9	76,9	High

Based on the average calculated value of the learning independence indicator, it can be seen that the learning independence of the class treated with the *discovery learning* model assisted by *liveworksheets* is the highest in the *posttest* with the initiative indicator with a value of 88.45 in the very high category. While the lowest indicator of learning independence in the *posttest* is self-confidence with a value of 84.37 in the high category. then in direct learning with printed LKPD in the *posttest*, the highest value obtained is the discipline indicator with a

value of 76.97 in the high category, then the lowest indicator of learning independence in the *posttest* is the self-confidence indicator with a value of 71.35 in the medium category.

Inferential Statistical Analysis

a. Normality Test

The normality test in this study is said to be normally distributed data, if the significant value (*Sig*) > 0.05 or 5%. The results of the normality test of the *pretest* and *posttest* data can be seen in Table 6.

Table 6. Normality Test Results

Statistics	Discovery Learning assisted <i>liveworksheets</i>	
	Pretest	Posttest
Kolmogorov Smirnov	0.200	0.089
<i>Sig Level</i>	0,05	
Conclusion	Normally	Normally

Based on the data in Table 6, it can be seen that all *pretest* and *posttest* data for both classes taught with the *discovery learning* model assisted by *liveworksheets* have *sig* > 0.05, so it can be concluded that the data groups are normally distributed.

b. Homogeneity Test

The homogeneity test in data research is said to be homogeneous if the significant value (*Sig*) > 0.05 or 5%. The variable homogeneity test can be obtained through the *homogeneity of variances* test with the help of SPSS 29.0 for windows. The results of the homogeneity test analysis can be seen in table 7.

Table 7. Homogeneity Test Results

Statistics	Pretest	Posttest
<i>Sig</i>	0.599	0.058
<i>Sig Level</i>	0,05	
Conclusions	Homogen	Homogen

Based on the in Table 7, it can be seen that the results of the variance homogeneity test obtained from the *pretest* scores and *posttest* scores in classes taught with the *discovery learning* model assisted by *liveworksheets* and classes taught in the form of direct learning with printed LKPD, both classes obtained significant results > 0.05 so that the biology learning independence data of students in classes taught

with the *discovery learning* model assisted by *liveworksheets* and classes taught in the form of direct learning with printed LKPD have homogeneous variances.

c. Hypothesis Test

This research hypothesis test is processed using anacova analysis contained in SPSS 29.0 for windows software. The criteria for accepting data whether there is an effect or not based on the significant value that comes out of the SPSS output, if the *sig* value < 0.05 then the *discovery learning* model assisted by *liveworksheets* has an effect. For more details, the data from the calculation of hypothesis testing is presented in table 8 below.

Tabel 8. Hypothesis Test Results

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7357.837 ^a	2	3678.918	345.524	<.001
Intercept	514.380	1	514.380	48.310	<.001
Pretest	3585.094	1	3585.094	336.712	<.001
Class	2303.376	1	2303.376	216.333	<.001
Error	670.784	63	10.647		
Totally	613025.000	66			
Corrected Totally	8028.621	65			

Based on the results of the anacova test, it shows that the significance value is < 0.001 which is smaller than the *sig* level < 0.05. So, it can be concluded that the acceptance of the hypothesis shows that the application of the *discovery learning* model assisted by *liveworksheets* can increase the independence of students' biology learning in animal tissue material class XI SMA Negeri 14 Makassar.

Discussion

Hypothesis testing in this study was conducted to determine whether or not there was an effect of using the *discovery learning* model assisted by *liveworksheets* on students' biology learning independence on animal tissue material that had been carried out, this was seen from the significance value obtained from the anacova test, where the significance value showed 0.001 (*Sig* < 0.05). So it is concluded that there is an effect of the *discovery learning* model assisted by *liveworksheets* on the learning independence of students in class XI animal tissue material at SMA Negeri 14 Makassar. This is in accordance with

the research of [Lestari et al., \(2023\)](#) which states that the application of the *discovery learning* model can increase the *learning* independence of students. This is reinforced by the results of research conducted by [Hayati et al., \(2017\)](#) that with the application of the *discovery learning* model there is a significant effect on student learning independence.

Based on the results of descriptive analysis of students' biology learning independence in the experimental class taught using the *discovery learning* model assisted by *liveworksheets* obtained a higher posttest average value of 86.09 than the average posttest value of the control class taught using a direct learning model with printed LKPD. This is because the LKPD made with the steps of the *discovery learning* model assisted by *liveworksheets* with various elements that exist by combining images, videos and discussion exercise questions so that it can make students become more enthusiastic and more interested in learning material.

In addition, it can help students to learn independently and train students to easily find their own answer in LKPD *liveworksheets* on animal tissue material so that students remember the concepts that have been learned longer. In accordance with the research of [Chodijah et al., \(2019\)](#) Learning is not only the process of memorizing a concept but also the interaction with the environment and the experiences they have had. By learning independently, students can be responsible for managing their own learning. In addition, it helps students become independent learners ([Bahri et al., 2021](#)). This is in accordance with [Salwan's research \(2017\)](#) which states that learning LKPD designed by combining pictures and summaries of the material presented can arouse students' enthusiasm for learning. The stages of *discovery learning* LKPD are designed to help students think and learn more actively to find material that is still incomplete in the LKPD.

The use of the *discovery learning* model assisted by *liveworksheets* can also increase the independence of students' biology learning in the learning process activities seen from the ability of students to ask questions related to problems related to learning materials and express opinions related to concepts that have been found and have been learned both in discussions with their group

friends. In the process of finding, students carry out a series of learning stages ranging from observing to organizing their findings into a concept of knowledge (Fadlilah *et al.*, 2020). This is in accordance with Soesilo *et al.* (2021) Student learning independence can be seen from learning activities. Students who have learning independence do not need to be ordered to learn but learn based on their own awareness, and learning activities are carried out on their own initiative. Learning independence in this study contains four indicators, namely self-confidence, responsibility, initiative, and discipline.

Based on the average value of each indicator of learning independence, it can be seen that there is an increase in each indicator of student learning independence before learning and after learning using the *discovery learning* model assisted by *liveworksheets*. Each indicator is in the very high category. The highest is the initiative indicator, while the lowest is the confidence indicator. However, these results have shown that there is an increase in the results of learning independence after the application of the *discovery learning* model assisted by *liveworksheets*. And in direct learning with printed LKPD. In the indicators of confidence and initiative are included in the medium category, while in the indicators of responsibility and discipline are included in the high category. Based on this description, the results show that in *discovery learning* assisted by *liveworksheets* and direct learning with printed LKPD there is an increase in students' learning independent after learning. This shows that initially students were less independent in the learning process. However, after learning using LKPD, students become more independent in terms of the average score, especially in the use of the *discovery learning* model assisted by *liveworksheets* to increase the independent of students with very high and high categories on indicators.

This study cannot be separated from the obstacles faced by researchers, such as in the process of learning activities, there are still students who find it difficult and are also a little confused when going to answer directly the *e-LKPD* questions on the *web* page because it is something new for students. However, all of this can be overcome by researchers by providing explanations, directions and also guidance to

students so that learning activities are still carried out and run smoothly. This is in line with Zahroh's research (2021) which states that students had experienced obstacles on operating *e-LKPD* on the *liveworksheets* page because students were still new to *e-LKPD* which could be accessed via *smartphone* and could be filled in on the *webpage* even though there were already instructions for using *e-LKPD*. Then another obstacle is that when students access the *liveworksheets web*, they need a good internet connection, so that the *e-LKPD* work runs smoothly. However, there are some learners who have a poor internet connection. This can be overcome by students joining their group friends who have a good internet connection to work on the LKPD together.

4. CONCLUSION

Based on the results of the research that has been done, it can be concluded that the *discovery learning* model assisted by *liveworksheets* has an effect on the biology learning independence of class XI students of SMA Negeri 14 Makassar on animal tissue material.

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