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The Effect of *Discovery* Learning Model on Students Learning Outcome at SMA Muhammadiyah 09

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Abstract:- This research aims to determine the effect of dicovery learning on students learning outcomes Muhammadiyah 09 high school students. The research method used quasi-experiments with 2 classes sample which determined using cluster random sampling techniques. Science class XI1 which was consisted of 38 students taught with the control class and science class XI2 which was consisted of 35 students taught with the problem solving learning model, the instrument used in this research is the testing of student learning outcomes. Data analysis techniques used Covariat Analysis with the SPSS 22.0 for Windows program. The results of the research showed that there was an influence on the learning model. 8,050. The research post-test data in the control class taught with conventional models shows an average post-test value of 2509 with a standard deviation of 11.190. While the experimental class students who were taught with the Discovery Learning model before treatment were also pre-tested and obtained a total score of 1975 with a standard deviation of 9,672. The number of experimental post-test scores was 2905 with a standard deviation of 4.678. Based on the acquisition of the average value of the post-test on this group of students, after being given different treatment between the experimental class and the control class there are significant differences in the value of learning outcomes. This is also proved by testing the hypothesis that is obtained by the value of sig 0,000 ≤ 0.05 at the level of significance α = 95%

Keywords:- *Discovery Learning, Conventional, Learning Outcomes Test.*

I. INTRODUCTION

Education is a conscious and a planned effort to create an atmosphere of learning and the learning process, so that the students actively develop their potential to have the spiritual, religious, and skills needed of themselves, needed of the people of the nation and needed of the state. In my opinion (Uzer, 2010), education is a process in developing humans to develop themselves in order to be able to face all the problems that arise in humans themselves.

High and low results are influenced by two factors, namely the external factors and the internal factors. Internal factors are the factors that originate from within the individual such as intelligence, attention, interest, talent, motivation, maturity and readiness. While external factors are all factors that originate from outside such as the environment. This environment consists of three namely family environment, school environment, and community environment.

Based on the observations done by the researchers at Muhammadiyah 09 Private High School by biology subject, the teacher (Mrs. Tini Kuswati S.Pd) that the model often used by teachers in teaching is the conventional model that is a direct learning model for example lecturing and questioning and answering methods, therefore students are lack of interesting and lack of understanding of the material being taught, students are also less active in the ongoing learning process because the students only listen to the teacher's explaination. According to Ms. Tini Kuswati S.Pd this has an impact on the students' learning outcomes which are low and unsatisfactory so that the KKM grades have not been obtained. The use of learning models is one of the solution for teachers to overcome these problems. One learning model that is considered able to improve the students' learning outcomes is a Discovery Learning model. According to research (Junita, 2014) is stated that the Discovery Learning model is developed for active student learning on how to find themselves, then the results obtained will be faithful and long-lasting in memory, not easily forgotten by students. By learning discovery, children can also think of analysis and try to solve their own problems. Furthermore (Alma et.al, 2010) also argues that the Discovery Learning model is referred to an inquiry approach that starts with a belief in the context of independent student development and has a basic strategy pattern which can be classified into four learning strategies namely the problem determination, the hypothesis formulation, the collection and the processing and the formulating conclusions.

II. METHODS

A. Place and Time

This research was carried out at Muhammadiyah 09 Private High School, Aek Kanopan, North Labuhanbatu district. The time of this research was conducted in April to June 2019.

B. Population and Samples

The population in this study were all class XI IPA Muhammadiyah Private High School 09, consisted of 73 students of 2 classes, namely IPA class XI1 with 38 students and IPA XI2 with 35 students.

The sample of this study was carried out with a sampling technique where the number of samples is equal to the population (total sampling) and obtained 2 classes as the research samples namely class XI IPA1 38 students and XI IPA2 35 students, where class XI IPA1 as the control class and class XI IPA2 as the experimental class.

C. Research Design

This research was a quasi-experimental (quasi-experimental) research. In this design the researcher used two classes, namely the experimental class and the control class. In the research later was given different treatment in each group. The experimental group was treated with the Discovery Learning model, while the control group was treated with the teachers' method (conventional), with the following research design:

D. Data Collection

In collecting data, the source of the data was determined first, and the instruments used were: (1) Pretest was used to find out that initially of the two groups have no difference in learning outcomes, so observations must be made using the initial test. The test is an objective test in the form of multiple choices (murtiple coice) with options (a, b, c, d and e) of 35 items relating to the excretion system in humans and animals which have been tested for validity and have validated 30 questions. The items were given to the sample class, (2) The final test (post-test) was used to determine the students' mastery of concepts after experiencing learning using the Discovery Learning model. And then the differences in learning outcomes were found after the treatments in the experimental group, the two groups were tested with post-tests with 30 items. Before the test was used, the Validation, Reliability, Difficulty, and Variance Test were carried out.

E. Data Analysis Techniques

➢ *Normality test*

Normality test was done to find out whether the initial data were normally distributed or not. Normality test aimed to determine if the harmony or the suitability of the data with a normal distribution or not.

➢ *Homogeneity Test*

This test was to determine the variance of the samples taken from the same population.

➢ *T-test*

T-tests were carried out to determine the significance of the Pre-test and the Post-test data or to test the differences in the two meanings, if the data obtained were normal and homogeneous to the real level then drawing the conclusions done by looking at the value of t with criteria as the following:

- If t test ≤ t table means there is no influence of Discovery Leaning model.
- If t test ≥ t table means there is an influence on Discovery Learning model.

In this study, the t-test was carried out by using SPSS statistics software program 22.

III. RESULTS AND DISCUSSION

A. The Description of Research Results

➢ *The Analysis of Research Instruments*

The test results of class XII IPA2 Muhammadiyah 09 Private High School obtained 30 valid questions from 35 questions tested so that the invalid questions were considered null or discarded.

➢ *The Data of Students Learning Outcomes*

- *The Data of Control Class Student Learning Outcomes*

Before conducting learning using conventional learning models, a pre-test was conducted firstly which aims to determine the initial abilities of the students without being influenced by learning. Furthermore, it was treated by using conventional methods. At the end of the lesson after all the subject matter of the excretion system had been completed, a control class student post-test was conducted.

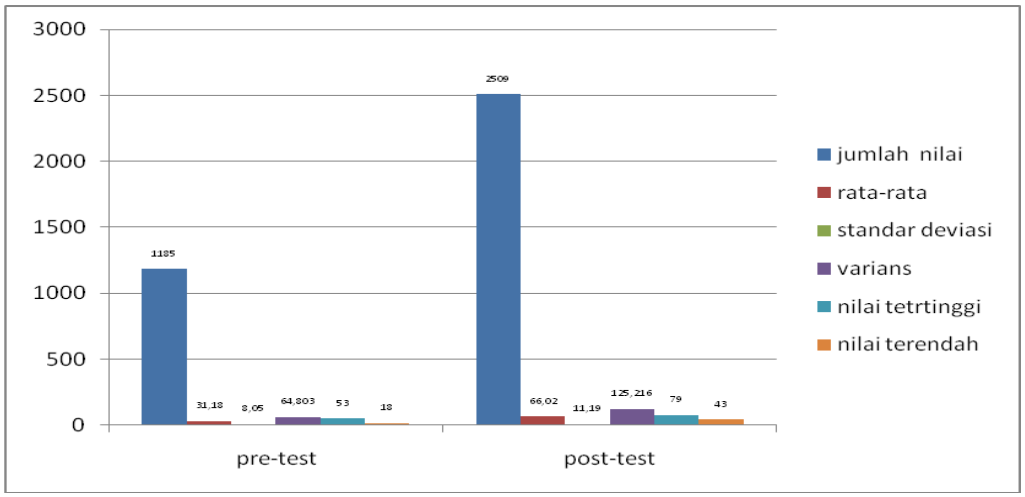

Fig 1:- Diagram of The Control Class Students Learning Outcomes

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Figure 1. showed the students' pre-test total score was 1185 and the average score was 31.18 and the standard deviation was 8,050 and the variance was64,803. the highest value was 53 and the lowest value was 18, while the students' post-test scores was 2509 and the average score was 66.02, the standard deviation was 125.216. The highest value was 79 and the lowest value was 43.

- *The Students Learning Outcomes of The Experimental Class*

For the students' of experimental class, before being treated using the Discovery Learning model, a pre-test is firstly conducted in order to determine the students' initial abilities. After knowing the students' initial abilities, then the students were given the treatment, at the end of learning after all the main material of excretion system had been taught, then a post-test was conducted to find out the students learning outcomes. The results of the pre-test and the post-test of the experimental class can be seen in figure 2.

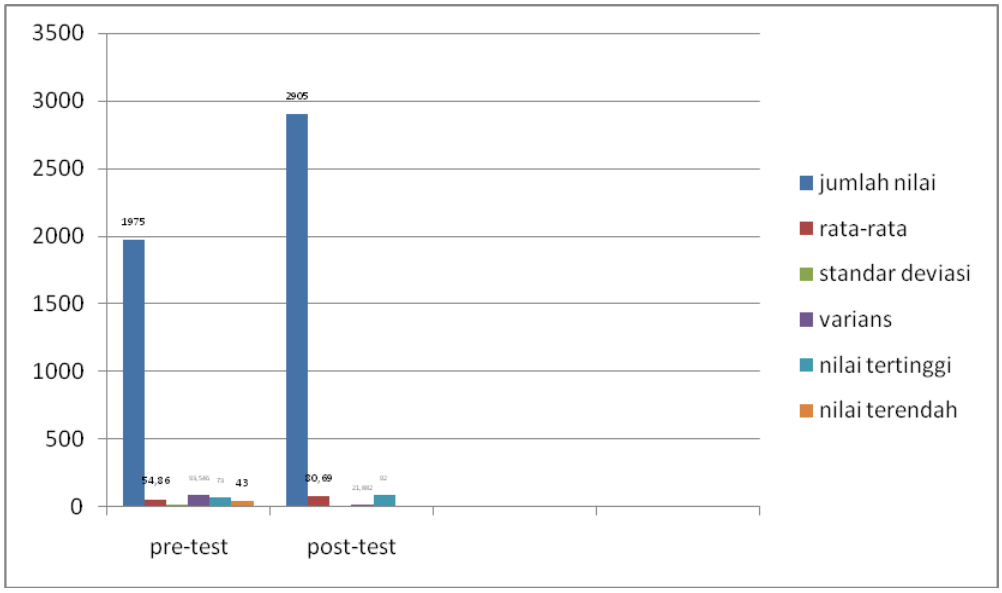

Fig 2:- The Diagram of The Students Learning Outcomes of the Experimental Class

Figure 2. showed that the students' pre-test scores was 1975 with the average value was 54.86 and the standard deviation was 9.672 and variance was 93.546, the highest value was 73 and the lowest value was 43, while in the post-test scores was 2905, the average value mean was 83, the standard deviations was 4.678, the highest value was 92 and the lowest value was 79.

- *The Description of Post-test Statistics Data*

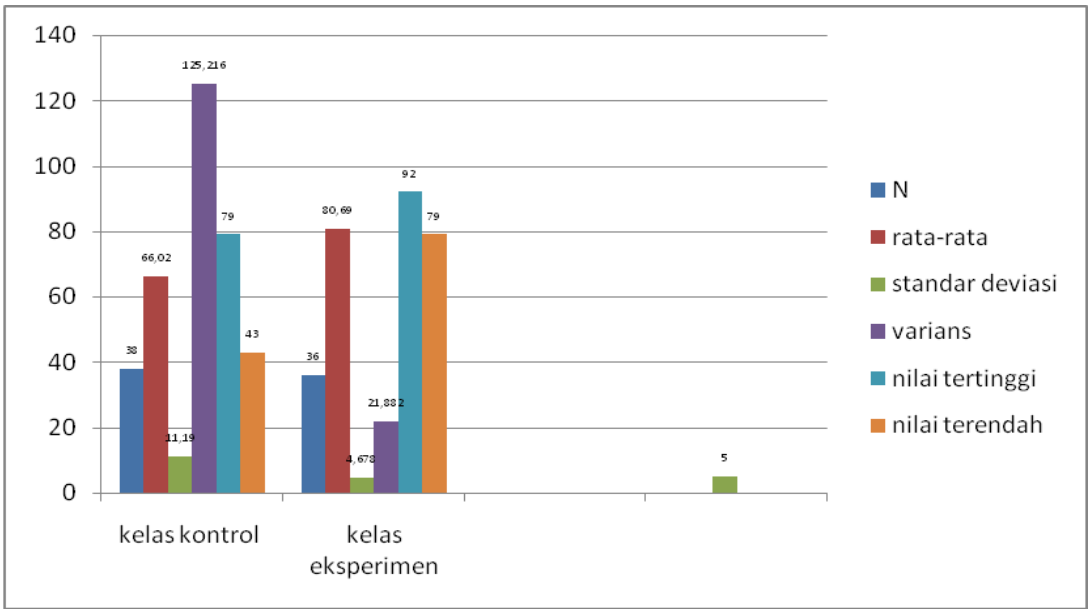

Fig 3:- Posttest Value Data of Control Class and Experiment Class

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Figure 3. showed that the average of 38 students' post-test was 66.02 and standard deviation was 11.190, the variance was 125.216 with the highest value was 79 and the lowest value was 43, while the students' post-test score of the experimental class of 35 students, its average score was 83, the standard deviations was 4.678 and the highest score was 92 and the lowest score was 79.

B. Data Analysis

➢ *Testing for Data Normality*

The basis for decision making in the normality test is: if the significance value ≥ 0.05 so that the data is normally distributed. Conversely, if the significance value ≤ of 0.05, the data is not normally distributed. The data used are pre-test and post-test.

- *The Normality of The Control Class*

The results of the normality was calculated using 1 K-S sample in SPSS version 22, it is known that the significance value of 0.200. the comparison was 0.200> 0.05, so it can be concluded that the data tested were normally distributed.

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		38
Normal Parameters[a,b]	Mean	,0000000
	Std. Deviation	8,01472328
Most Extreme Differences	Absolute	,078
	Positive	,078
	Negative	-,068
Test Statistic		,078
Asymp. Sig. (2-tailed)		,200[c,d]

Table 1:- Calculation Results for Normality Control Data Class Test

- *The Normality Test of the Experiment Class*

The results of the normality was calculated using 1 K-S sample in SPSS version 22, it was known that the significance value was 0.200. the comparison was 0.200> 0.05, so it can be concluded that the data was normally distributed.

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		35
Normal Parameters[a,b]	Mean	,0000000
	Std. Deviation	8,28395191
Most Extreme Differences	Absolute	,113
	Positive	,113
	Negative	-,100
Test Statistic		,113
Asymp. Sig. (2-tailed)		,200[c,d]

Table 2:- The Results of Normality Test of Experimental Class

➢ *Homogeneity Test*

Data homogeneity testing was intended to determine whether the two groups of the students used as the research samples had homogeneous data variance and they can represent other populations. The data homogeneity testing was done using SPSS statistics version 22 software in the pretest of the two sample groups

- *The Homogeneity of Control and Experimental Class Pretest Data*

Homogeneity calculation used one way ANOVA SPSS version 22, the significance value was 0.489. so, 0.489> 0.05, so it can be concluded that the pretest data were homogeneous.

Test of Homogeneity of Variances			
Levene Statistic	df1	df2	Sig.
,931	6	27	,489

Table 3:- Calculation Results for Pretest Data Homogeneity Test

- *The Homogeneity of The Post-Test Control Class and The Experiment Class*

Homogeneity calculation used one way ANOVA SPSS version 22, the significance value was 0.084. So, 0.084> 0.05, so it can be concluded that the data were homogeneous.

Test of Homogeneity of Variances			
Levene Statistic	df1	df2	Sig.
2,442	3	30	,084

Table 4:- The Results of Post-Test Data Homogeneity Calculation

➢ *Hypothesis Test*

After analysising the data requirements, namely the normality test and the homogeneity test were obtained, then testing the hypothesis was done. Hypothesis testing was performed on the post-test values of the two sample groups by using a different test. The test results in the attachment were obtained. Thus, the alternative hypothesis or Ha which states that there is influence of the Discovery Learning model on the subject matter of excretion system in class XI IPA Muhammdiyah 09 Private High School, North Labuhanbatu, Aekkanopan.

The test used paired sample t-test showed 0,000. So the value of sig. (2-tailed) = 0,000 <0.05, then there is a significant difference between learning outcomes in the pretest and the posttest data which means that there is an influence of the use of Discovery Learning on the students' learning outcomes. It can be seen from the results of the t-test below.

Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1 pretest – posttest	-26,57143	8,28991	1,40125	-29,41911	-23,72374	-18,963	34	,000

Table 5:- Test Calculation Results t

IV. DISCUSSION

The control class students were taught by using the lecturing method, it was given a pre-test before being treated, and a total score was obtained 1185 and the standard deviation was 8.050. The research post-test data in the control class was taught with conventional models. It showed the average post-test value was 2509 and the standard deviation was 11.190. While the experimental class students who were taught with the Discovery Learning model before treatment were also pre-tested and obtained a total score 1975 and the standard deviation was 9,672. The experimental post-test scores was 2905 and the standard deviation was 4.678. Based on the acquisition of the average value of the post-test on this group, after being given different treatment between the experimental class and the control class there were the significant differences in the value of learning outcomes. This was also proved by testing the hypothesis that was obtained by the value of sig 0,000 ≤ 0.05 at the level of significance α = 95%

Then it can be seen from the average value of the 2 classes used as a research sample, classes that are parallels using discovery learning models get an average value of 83 while the control class obtains an average value of 66.02. This is due to the discovery learning model which turns out to be more motivating for students to be more active and creative.

Discovery Learning is a learning model that can help students think more creatively. According to the definition (Kurniasih, 2014), Discovery Learning is a learning process that occurs when learning material is not presented in its final form, but it is expected that students organize themselves through observation or experimentation. Furthermore (Cahyo, 2013), also states that students have the opportunity to be actively involved in learning, students can find patterns in concrete and abstract situations, learn to formulate question and answer strategies, help students form effective ways of collaboration, skills learned in learning situations discoveries are more easily transferred.

The experimental class students who were taught using the Discovery Learning learning model, seemed enthusiastic in the learning process, especially when playing groups and finding out for themselves the questions given by the teacher from their observations and from other book sources. Discovery learning makes students more creative and makes it easy for students to remember lessons. This can be seen from the increase in students' post-test results. Based on the results of this study it can be concluded that the Discovery Learning model has a significant effect on student learning outcomes.

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V. CONCLUSIONS

Based on the results of research conducted, the conclusions were:

- The average of learning outcomes of Discovery Learning on the subject matter of the excretion system was 83 while the average score using the conventional method is 66.02, discovery learning model affected the student learning outcomes in the excretion system material in class XI IPA Muhammdiyah 09 Private High School, North Labuhanbatu Learning Year 2018/2019.
- From the hypothesis test was obtained t count> t table. 0.338> 0.000 as a hypothesis the value of H0 is rejected and Ha is accepted. So, there was a significant difference in the student learning outcomes.

REFERENCES

[1]. Arikunto, S. 2012. Dasar-Dasar Evaluasi Pendidikan Edisi 2. Jakarta: Bumi Aksara. Arikunto, S. 2012. Dasar-Dasar Evaluasi Pendidikan Edisi 2. Jakarta: Bumi Aksara.

[2]. A Harahap,2015. Perbedaan Hasil Belajar Siswa yang diajarkan Dengan Menggunakan Metode Diskusi Dengan Penerapan Prediction Guide (Tebak Pelajaran) dan Tanpa Penerapan Prediction Guide Pada Materi. Jurnal Pembelajaran dan Biologi Nukleus 1 (1), 25-28

[3]. Brickman, P., C. Gormally, N. Armstrong, B. Hallar. 2009. Effects of Inquiry-based Learning on Students' Science Literacy Skills and Confidence. International Journal for the Scholarship of Teaching and Learning. 3(2): 1-22.

[4]. Amiyani, R.,& Widjajanti, J.B. (2019). *Self – Confidence and matthematics achievement using guided discovery learning in scientific approach*. In journal of physics: Conferences Series (Vol. 1157).

[5]. Balim, A. G. 2009" *The effect of discovery Learning on student success an inquiry Skills*". Eurasian Journal Research Issue 35, 1-21

[6]. Bruner, J. S. 1961. *The Act of discovery*. Harvard Ed. Rev, 31:21-32.

[7]. Capuano, n., & Toti, D (2019). Experimentation of a smart Learning system for law based on knoledge discovery and cognitive computing. Computer in human behaviour, 92, 459-467.

[8]. Dimyati dan Mudjiono. 2006. *Belajar dan Pembelajaran.* Rineka Cipta: Jakarta.

[9]. Djamarah, Saiful Bahri dan Azwan Zein. 2010. *Strategi Belajar Mengajar*. Rineka Cipta: Jakarta.

[10]. Dewa Ayu Citra Rasmi1, 2019. Pola pembelajaran biologi dengan model discovery learning di madrasah aliyah Negeri 2 mataram J. Pijar MIPA, Vol. 14. No. 3

[11]. Firosalia Kristin, 2016. *Analisis model pembelajaran discovery learning dalam meningkatkan hasil belajar siswa*. Pendidikan Guru Sekolah Dasar, Universitas Kristen Satya Wacana. Volume 2, Nomor 1.

[12]. Kemendikbud. 2016. No 22 tahun 2016 *tentang proses pendidikan dasar dan menengah* (Jakarta: Kementrian pendidikan dan kebudayaan.

[13]. Matthews, M. R. 2002. *Constructivism and science education*: A further appraisal. Journal of Science and Technology 11(2):121-134

[14]. Martaida, T., Bukit, N., dan Ginting, E.M. 2017. *The Effect of Discovery Learning Model on Student's Critical Thinking and Cognitive Ability in Junior High School*. Journal of Research & Method in Education. Vol 7, No.1.

[15]. Muhammad Yusuf, 2015. *Penerapan Model Pembelajaran Discovery Learning Menggunakan Pembelajaran Tipe Shared dan Webbed untuk Meningkatkan Keterampilan Proses Sains*. Jurnal Penelitian & Pengembangan Pendidikan Fisika. Volume 1 Nomor 2.

[16]. Nurlaeli, N.P., Siti Nurul Hidayah., & Tutut Nurita. 2015. *Implementasi Model Pembelajaran Discovey Learning Berorientasi Saintifik untuk melatih keterampilan berpikir kritis siswa pada topik perubahan materi*

[17]. Pratiwi, FA 2014, *Penggunaan Model Discovery Learning dengan Pendekatan Saintifik Terhadap Keterampilan Berpikir Kritis Siswa Pada Materi Larutan Elektrolit dan Non Elektrolit*. Universitas Tanjung Pura Pontianak, 24 Maret 2015 pp.1-16.

[18]. Putrayasa, I Made, dkk, (2014)" *pengaruh Model Pembelajaran Discovery Learning dan minat belajar terhadap hasil belajar IPA siswa*". Jurnal Mimbar PGSD Universitas Pendidikan Ganesha/Vol No.1.

[19]. Rezak, C.J. 2006. Paradigm Learning : The Power of Discovery Improving Corporate Training Results with Discovery Learning Methodology.