The Effect of the Discovery Learning Model on Student Biology Learning Outcomes on Human Digestive System Materials Class XI SMA Negeri 2 Tondano

by Etin Ruban

The Effect of the Discovery Learning Model on Student Biology Learning Outcomes on Human Digestive System Materials Class XI SMA Negeri 2 Tondano

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Abstract. This study aims to determine the influence of the Discovery Learning learning model on the cognitive learning outcomes of students' biology on the material of the human digestive system in class XI of SMA Negeri 2 Tondano. With this research method, it is quasi-experiment research. The result is a significance value (2-tailed) < 0.05, then H0 is rejected and H1 is accepted. In the results of the "t" test, a significant number (2-tailed) 0.000 < 0.05 is obtained, then H0 is rejected and H1 is accepted, meaning that there is an influence of the discovery learning model on the learning outcomes of Biology. Then it is seen from the average learning outcomes after being given treatment. Based on the results of the analysis, it shows that the average value of the experimental class at the time of the Pretest is 31.24 while the control class is 24.49. At the time of the posttest, the average score of the experimental class reached 86.82 while the control class was 57.27.

Keywords: Learning Model, Discovery Learning, Learning Outcomes, Biology, human digestive system.

Abstrak. Penelitian ini bertujuan untuk mengetahui pengaruh model pembelajaran Discovery Learning terhadap hasil belajar kognitif biologi siswa pada materi sistem pencernaan manusia kelas XI SMA Negeri 2 Tondano. Dengan metode penelitian ini yaitu penelitian eksperimen semu atau quasi experiment. Hasilnya adalah nilai signifikansi (2-tailed) < 0,05, maka H0 ditolak dan H1 diterima Artinya adalah H1 dapat diterima. Pada hasil perhitugan uji "t" diperoleh nilah signifikan (2- tailed) 0,000 < 0,05 maka H0 ditolak dan H1 diterima berarti ada pengaruh dari model discovery learning terhadap hasil belajar Biologi. Kemudian dilihat dari rata-rata hasil belajar setelah diberi perlakuan. Berdasarkan hasil analisis menujukkan bahwa nilai rata-rata (mean) kelas eksperimen pada saat pretest sebesar 31,24 sementara kelas kontrol yaitu 24,49. Pada saat posttest nilai rata-rata (mean) kelas eksperimen mencapai 86,82 sedangkan kelas kontrol sebesar 57,27.

Kata kunci: Model pembelajaran, Discovery Learning, Hasil Belajar, Biologi, Sistem Pencernaan Manusia.

1. INTRODUCTION

Education is an effort to prepare the young generation to face the era of globalization. Therefore, education must be carried out as much as possible to provide high-quality education and improve the quality of human resources (Amalia, 2018; Nurrita, 2018; Novita et al., 2020). The purpose of education itself is to form a generation that completely has intellectual intelligence, a good attitude, and the necessary skills to live life in society (Yusuf, 2017; Santika, 2020; Bahari, 2022).

Learning is a process that exists in the environment around students, which can foster and stimulate students' interest in it (Charli et al., 2019; Barus & Sasinggala, 2022). Learning aims to help students gain various experiences, which are in the form of knowledge, skills, and values/norms (Yusuf, 2017; Firmadani, 2020). The lack of learning information sources can hinder the achievement of the goals of the learning process (Firmadani, 2020; Fitriyah, 2021).

Learning is defined as a constant and thorough process of change resulting from an individual's response to a particular situation (Maulida, 2018; Charli et al., 2019). Learning is essentially not only reading, listening, writing, doing homework, and tests, but also behavioural changes resulting from learning process activities, where there is a positive interaction with the environment, and these changes are permanent (Setiawati, 2018; Nabilla & Abadi, 2019; Novita et al., 2020).

According to Novita et al. (2020), learning outcomes are abilities that children acquire through learning activities. Learning outcomes have an important role in the learning process because they provide information to teachers about students' progress in an effort to achieve their learning goals through further teaching and learning activities (Nabillah & Abadi, 2019; Novita et al., 2020; Rahmayani, 2019).

Based on the results of a study at SMA Negeri 2 Tondano, conventional learning tends to make students act passively and eventually make teaching and learning activities boring, especially in biology learning. The problem is that the learning carried out by teachers in the classroom is less varied in selecting the right model to increase students' desire to learn, where teachers are more active in the learning process while student involvement is very small. This makes students less interested in learning and just listen to what the teacher conveys without feeling challenged to find other information.

To overcome the above problems, a learning model is needed that allows students to actively express their opinions and find their own concepts, namely a learning model using discovery learning (Nurrita, 2018; Rahmayani, 2019). The discovery learning model is one of the student-centred learning models, which requires students to actively learn (Maulida, 2018; Santika, 2020). The application of the discovery learning model is important because it motivates students to seek answers to the questions asked, and is instructed to search and find concepts, principles or answers that are used as questions (Amalia, 2018; Wati, 2019).

2. METHOD

This research has been carried out at SMA Negeri 2 Tondano, South Tondano District, Minahasa Regency. The research subjects involved are students of class X science in the even semester of the 2022/2023 school year, one class with a total of 21 students. Sampling was carried out by cluster random sampling.

This type of research is quasi-experimental research. In the pseudo-experiment, there are two groups or classes: the experimental and control classes. The discovery learning model was used in the experimental class, while the conventional learning model was used in the control class.

The research design used in this study is Nonequivalent Control Group Design. In this design, two groups are randomly selected, then the first group (experiment) is treated using the discovery learning model while the second group (control) uses the conventional model. This design is appropriate to use when the pretest and posttest can affect the experimental class. The research design of the Nonequivalent Control Group Design, according to Sugiyono (2013), is as follows:

Table 1. Research Design

Group (R)	Pre-Test	Treatment	Post-Test
Experimental Group	O	x_1	O
Control Group	O	x_2	O

Information:

R   = Group

x_1 = Treatment in the form of guided inquiry learning

x_2 = Treatment in the form of conventional learning

O = Pretest and Post-test results of experimental and control classes

In this study, the population taken was all XI Science students, consisting of 2 classes, XI Science a and XI Science b, at SMA Negeri 2 Tondano, who were registered in the 2022/2023 school year.

The sample in this study consists of two classes, namely the experimental and control classes. Class XI Science is an experimental class with a total of 11 students, and class XI Science is a control class with a total of 21 students.

The variables in this study consist of independent variables and bound variables. The independent variable is the discovery learning model, and the bound variable is the cognitive

learning outcome of students in class XI science of SMA Negeri 2 Tondano on the material of the digestive system in humans.

The data collection techniques used in this study are tests and non-tests. Statistics were analyzed by t-test with a significance level ($\alpha = 0.05$). Previous analytical requirements tests used normality tests and homogeneity tests.

3. RESULT AND DISCUSSION
a. Result

The results of the pretest and posttest of the control class and the experimental class of the students can be seen in Table 1 and Table 2 below:

Table 1. Control class data

No	Statistics	Statistical value	
		Pretest	Posttest
1	Minimum Score	15	50
2	Maximum Score	35	65
3	Average	24,49	57,27
4	Standard Deviation	7.891	6.068

Table 2. Experimental class data

No	Statistics	Statistical value	
		Pretest	Posttest
1	Minimum Score	20	80
2	Maximum Score	45	100
3	Average	31,24	86,82
4	Standard Deviation	8,970	6.431

In Tables 1 and 2, the average value of the experimental class at the time of the pretest was 31.24, while the control class was 24.49. At the time of the posttest, the average score of the experimental class reached 86.82, while the control class had an average score of 57.27. This shows that at the time of the pretest, the experimental class had a lower average score before being treated. However, the experimental and control classes experienced an increase in the mean of student learning outcomes after being given different treatments.

b.   Data Analysis Prerequisite Test

The pretest-posttest results of the experimental class and the control class have a significance of > 0.05, so the data group is normally distributed. Based on the data homogeneity test results in the control and experimental classes, both come from the same population (homogeneous).

After the prerequisite test is carried out, the next step is to test the hypothesis. The results of the data hypothesis test in the control class and the experimental class showed that the treatment was significantly different.

Based on the data analysis test using SPSS on both the pretest and posttest data of the experimental and control classes, the two data were normally and homogeneously distributed because the hypothesis test was continued with the paired sample t-test. The significance of the paired sample t-test determines the decisions made in the study.

Based on the results of the statistical data, it can be said that the significance value (2-tailed) < 0.05, then H0 is rejected, and H1 is accepted because the significance value of the experimental class pretests-posttests is 0.000. The control class pretests-posttests also have a value of 0.000, so it can be concluded that this study can test the correctness of the hypothesis, namely the significant influence of the discovery learning model on the learning outcomes of Biology on the learning outcomes of grade xi students. Has an influence. This is also shown by the average students of the experimental class, who obtained higher scores than those of the control class.

c.   Discussion

The test results showed an influence of the discovery learning model on the learning outcomes of Class XI students of SMA N 2 Tondano on the human planning system material.

This is based on the results of hypothesis testing using t-test on pretest-posttest data for the experimental and control classes. In the results of the calculation of the "t" test, a significant value (2-tailed) of 0.000 < 0.05 was obtained, then H0 was rejected, and H1 was accepted, which means that there is an influence of the discovery learning model on the learning outcomes of Biology. Then, it is seen from the average learning outcome score after treatment. Based on the analysis results, it was shown that the average value of the experimental class at the time of the Pretest was 31.24, while the control class was 24.49. At the time of the post-test, the average score of the experimental class reached 86.82, while the control class was 57.27. The following is a diagram of the mean values of the experimental and control classes during the pretest and posttest.

This situation shows that the learning outcomes of students who use the discovery learning model are better and have a positive impact than those who use conventional learning. This is supported by the results of the observation of student responses during learning, which are in the good category with a score of 85. Some students respond positively to Biology learning using the discovery learning model. So, it can be stated that students can receive learning using the discovery learning model well.
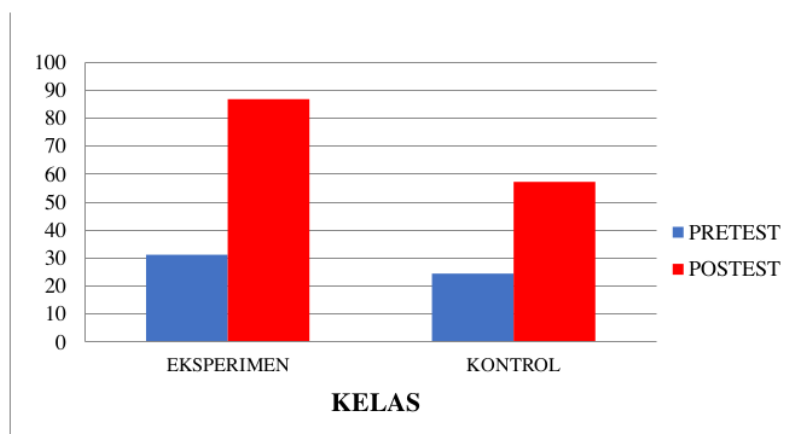

Figure 1. Diagram of the average value of the experimental class and the control class

The information shows significant results because the discovery learning model is one part of discovery learning that involves many students in teaching and learning activities. Still, in the discovery process, students receive assistance or guidance from teachers to be more

directed, and both the learning implementation process and the goals achieved are carried out properly. Providing this model can cause interaction in teaching and learning activities. These interactions can also occur between students and students, students with teaching materials, students with teachers, and students with teaching materials and teachers. Interaction can also be carried out between students in small and large groups. In carrying out activities or discoveries in small groups, students interact with each other. This interaction can also be in the form of sharing with each other, or weak students asking questions and being explained by better students.

Researchers apply a learning model that is in accordance with the characteristics of students and can improve learning outcomes by using a discovery learning model that significantly influences student learning outcomes, especially in the field of Biology. This illustrates that the discovery learning model is one of the determining factors in improving learning outcomes because students can understand concepts, meanings and relationships through an intuitive process to conclude that it can affect student learning outcomes. Nur and Anisa (2021) said that the *discovery learning* model has the potential to provide a more meaningful learning experience for students in the process of discovering concepts. Students carry out activities such as observing, classifying, making guesses, explaining, measuring and drawing conclusions. Then Mufti Ali & Dini Desty Setiani (2018) said that the discovery learning model and direct learning influence student learning outcomes; this can be seen from the increase in pretest-posttest scores. The difference can be seen from the influence of student learning outcomes using the discovery learning model, and the influence of student learning outcomes using the direct learning model can be seen in the students' final scores (posttest).

This study's results align with research conducted by Kadri and Meika (2015), which states that the discovery learning model significantly influences conventional learning in improving learning outcomes.

4.   CONCLUSIONS AND SUGGESTIONS

From the results of the research that has been described, it can be concluded that the discovery learning model has a significant influence on student learning outcomes on the material of the human digestive system class XI of SMA N 2 Tondano. The achievement of learning outcomes of students in the experimental class who were taught using the discovery

learning *model had a higher* average score than the control group taught without using *the discovery learning* model.

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