# Analysis of Students' Conceptual Understanding When the Discovery Learning Learning Model is Applied: Does It Have a Real Impact?

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## Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh model discovery learning terhadap pemahaman konsep pserta didik. Penelitian ini adalah penelitian *quasi eksperimental* atau penelitian quasi eksperimen. Yang mana peneltian ini hanya menggunakan *posttes* atau tes akhir setelah diberikan perlakuan. Desain yang digunakan yaitu *Posttest Only Control Group Desig*.Hasil penelitian menunjukakn bahwa terdap nilai skor rata-rata peserta didik kelas eksperimen yang menggunakan model *discovery learning* sebesar 55,44, maksimum 100, minimum 0, dan nilai standar deviasi sebesar 30,072. Dan untuk kelas kontrol yang menggunakan model konvensional nilai skor rata-rata peserta didik kelas eksperimen 40,09, maksimum 79, minimum 0, dan nilai standar deviasi sebesar 25,693. Hal ini sekaligus menunjukkan adanya dampak yang positif apabila pelekasanaan pembelajaran menggunakan model pembelajaran Discovery Learning.

***Kata Kunci***: *Dampak Nyata, Discovery Learning, Pemahaman Konseptual, , Siswa*

## Abstract

This research aims to determine the effect of the discovery learning model on students' understanding of concepts. This research is quasi-experimental research or quasi-experimental research. This research only uses posttests or final tests after being given treatment. The design used was Posttest Only Control Group Design. The research results showed that the average score of experimental class students who used the discovery learning model was 55.44, a maximum of 100, a minimum of 0, and a standard deviation value of 30.072. For the control class using the conventional model, the average score of experimental class students is 40.09, the maximum is 79, the minimum is 0, and the standard deviation value is 25.693. This also shows a positive impact if learning is implemented using the Discovery Learning learning model.

*Keywords:* Discovery Learning, Conceptual Understanding, Real Impact, Student's

## Introduction

In human life, the term "learning" is very familiar (Misbah et al., 2022; Yusuf et al., 2022; Zb et al., 2022). Learning is a process of changing behavior and gaining knowledge (Nofriadi & Yestin, 2022; Putri

et al., 2022). Learning is a process of acquiring knowledge that can improve skills, attitudes and strength of character (Nada et al., 2022; Sinaga et al., 2022; Wahyuni & Taqwa, 2022). In human life, the term "learning" is very familiar. Learning is a process of changing behavior and gaining knowledge (Harefa et al., 2020). Experiencing significant learning is a sign of additional good learning experience. Many parties are involved in other learning processes. Many parties are involved in the learning process, such as teachers, participants, objectives, materials, sources, methods and assessment. Therefore, to encourage an effective and efficient learning process, such as learning physics, teachers and students must work together.

Physics is a subject in education that studies natural events (Sulman, 2012; Sulman et al., 2020; Sulman, Tanti, et al., 2021; Zb, Novalian, Rozal, et al., 2021 ). Where physics is a science that uses scientific methods, concepts are obtained and developed through systematic steps and scientific evidence (Meiliani et al., 2021; Zb et al., 2020; Zb, Novalian, Ananda, et al., 2021 ). Therefore, studying physics is an important science to study. Physics is also an abstract science where the material uses theoretical concepts which sometimes the material can be seen directly or indirectly (M. Reyza et al., 2022; Rozal et al., 2021; Sulman, Sutopo, et al., 2021; Sulman , Yuliati, Kusairi, et al., 2022; Sulman, Yuliati, Purnama, et al., 2022), sometimes makes it difficult for students to understand the concepts being studied (Puspitasari et al., 2021). Physics is one of the subjects in high school (SMA), where this subject is a subject that is considered difficult for students. They think that this subject has too many formulas that are difficult for them to understand. So there are many factors that influence the learning process and learning outcomes are poor, especially in physics lessons. Physics lessons cannot only study theory (Putra et al., 2021; Sulman et al., 2020) but emphasize how the theory is applied in real life (Prihatiningtyas et al., 2013).

Teachers in the learning process have a very important role, because teachers are also one of the factors in determining the success of each teaching and learning approach, especially because they make decisions to improve thinking skills (Ananta & Kurniawan, 2023; Haqiah et al., 2023; Purnomo et al., 2023; Purnomo et al., 2023; Purnomo et al., 2023; al., 2023) by encouraging students to think deeply, discuss, exchange ideas, make decisions (Aizikovitsh-Udi & Amit, 2011). Physics learning is taught so that students are able to solve problems and understand concepts well and are able to express ideas in everyday life. Learning is said to be successful if students are able to understand the concepts being studied. However, learning cannot be said to always run smoothly (Fiqri et al., 2023; Pamuji & Mawardi, 2023; Roshita et al., 2023; Wilita et al., 2023), but if he is able to understand the concepts he is learning then it will be easy to apply it in real life. Teachers must pay attention and be able to overcome problems in learning, one of which is by implementing appropriate learning models (Aulya et al., 2023; Pramita & Putri, 2023; Sapitri & Indriyati, 2023). Teachers must design and prepare an appropriate learning process so that learning objectives can be achieved. The learning process consists of stages of teacher and student activities that will be implemented in a learning model.

The learning model can be said to be a structural model that provides and directs teachers in teaching (Aizikovitsh-Udi & Amit, 2011) and teachers must be able and able to create and see the conditions and situations that occur in the classroom when learning takes place so that it is easy to convey the material being taught (Firman & Efendi , 2023; Islamiah et al., 2023; Maya et al., 2023) and students can easily understand the concepts being taught, especially physics material (Bouchée et al., 2023).

Understanding concepts is one of the factors that has a significant impact on students' educational outcomes, but even in this case, the results may not be enough to show that students really understand what has been taught (Bohori & Liliawati, 2019; A. T. Reyza et al ., 2020). However, when their students are able to explain the importance of the material presented through lectures, books, and computer screens, they will likely reach conceptual maturity. So a strong understanding of concepts is a person's ability to understand material in the physics learning process.

The learning process that we can see facilitates students in expressing their ideas and opinions in accordance with physics concepts, one of which is Discovery learning. Discovery learning is a learning process where a concept is not presented in its complete form, but students must organize their learning by exploring these concepts (Bao & Fritchman, 2021; Vuztasari et al., 2023). Discovery learning is a learning process for students in active activities. Discovery learning is learning by students where they construct their own knowledge by experimenting and making conclusions from the results of their experiments (Nurulhidayah et al., 2020; Vuztasari et al., 2023)

Discovery learning is a learning model where students determine their own way of developing active learning by discovering and investigating for themselves. From the opinions expressed by experts, it can be stated that Discovery learning is learning in which students are active and active in learning to discover their own knowledge and concepts. In learning, the teacher only acts as a facilitator and directs students to be able to find problems, concepts and procedures that are appropriate. delivered by the teacher so that they are able to understand the concepts that have been taught.

The steps in learning the Discovery learning model are: first, identifying students' needs, second, choosing a principle introduction, conceptual understanding, and generalization of knowledge, third, choosing materials, exercises, fourth, assistance and clarifying the tasks faced by students and understanding each problem, fifth, preparing the classroom. and the tools needed, sixth Checking students' understanding of the problem to be solved, seventh Creating opportunities for students to explore, eighth Helping students with information/data if they ask, ninth Directing people to self-analysis with leading questions and problem identification, ten Helping students in formulating principles and generalizing the results of their findings (Chusni et al., 2020)

The advantages of this Discovery learning model are that first, it emphasizes students' own information processing, second, it increases students' self-awareness of the discoveries they make, third, it has a

greater possibility of improvement, expansion and mastery of skills in the cognitive process of as many students as possible, fourth, discovery- discoveries that students gain become assets and are difficult to forget, and finally, don't make teachers the only source of learning because students can learn how to use different types of learning resources. Based on the description given, the aim of this research is to determine the effect of Discovery learning on students' conceptual understanding.

**Method**

This research used a quantitative approach. Where the type of research used is quasi experimental (Creswell, 2012). This research only uses posttests or final tests after being given treatment. Quasi-experimental research is a method used to find the effect of treatment on others under limited conditions. The design used is Posttest Only Control Group Design. Where this research uses 2 class groups, namely the control class and the experimental class with treatment X using the Discovery learning learning model. This research was conducted to determine the effect of treatment on students' conceptual understanding in control and experimental classes. For more details, see table 1.

**Table 1.** *Research design*

| Group | Treatment (X) | *Posttest* |
|---|---|---|
| $R_1$ | X | $Q_1$ |
| $R_2$ | | $Q_2$ |

This research has 2 variables, namely the independent variable and the dependent variable. The independent variable in this research is the discovery learning learning model and the dependent variable is concept understanding. The population used in this research were all class XI students at Al Falah Islamic High School, Jambi City. Sampling used purposive sampling technique. The population in this study was all class XI Phase F. Samples were drawn using a purposive sampling technique. There was one class as a control class without treatment, totaling 32 students and one experimental class with treatment (X) using the discovery learning learning model, totaling 34 students. The instrument used to collect data in this research was a test in the form of multiple choice questions on physics material with a total of 5 questions. The test was given to the control class and experimental class. The data analysis techniques used in this research are normality test, homogeneity test and hypothesis test to see the effect of discovery learning model treatment on students' mastery of concepts in learning physics material.

**Results and Discussion**

Students' conceptual understanding was measured using a posttest which used an essay question format consisting of 5 questions. This test is used to see the effect of a treatment consisting of 2 class groups, namely the experimental class and the control class. In this research, the experimental class used a model that the teacher considered to have good learning outcomes, namely using the discovery learning model. Based on the research that has been carried out, there is data on students' conceptual understanding scores. From the data collection obtained, there is data on students' conceptual understanding scores. The following data is presented in table 1 below.

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**Table 2. Data on concept understanding scores for experimental class and control class students**

| | | |
|---|---|---|
| Experimental Class | Average value | 55,44 |
| | Maximum Value | 100 |
| | Minimum Value | 0 |
| | Standard Deviation | 30,702 |
| Control class | Average value | 40,09 |
| | Maximum Value | 79 |
| | Minimum Value | 0 |
| | Standard Deviation | 25,693 |

Based on the table above, it was found that the average score for understanding the concepts of experimental class students was higher at 55.44 compared to the score for understanding concepts for the control class with a value of 40.09. The minimum score for the experimental class is the same as the score for the control class. Meanwhile, the maximum score for the experimental class was 100 higher than the score for the control class, which was 79. And for the standard deviation value, the experimental class score was greater, namely 30.702, compared to the control class, which had a score of 25.693. This means that after being given treatment, it can be said that the experimental class that used the discovery learning model was larger and improved compared to the control class that used the conventional model.

Table 2. Homogeneity Test Results of Posttest Values for Experimental Class and Control Class

**Test of Homogeneity of Variances**

| Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|
| .199 | 1 | 64 | .657 |

Based on the table above, it can be seen that the value 0.657 > 0.05 so that the data above is declared homogeneous. In the process of this research, based on the results of data analysis, it can be explained that understanding physics concepts is the ability of students to recognize, understand, give examples, guess, compare, explain and use physics concepts, processes and ideas based on knowledge that does not require memorizing. This ability to understand cannot be given by force because physics concepts must be given with examples in everyday life and logically (Rahim & Nadira, 2022; Ramadhani & Nurita, 2022). If the student forgets the formula given then the problem cannot be solved. The way a teacher presents material and teaches as well as how the teacher uses the model he teaches and uses influences students' understanding of concepts (Zehirlioglu & Mert, 2020; Zhang & Zhang, 2018; Zheng et al., 2021). Because the model used by the teacher really influences the learning outcomes of students in class. The more appropriate the model used, the learning outcomes of students will increase. The model used in this research uses the discovery learning model.

Quasi-experimental research regarding the influence of the discovery learning model on understanding concepts in physics material for class XI Phase F which has different average calculated scores. This is because a person's understanding of concepts will be able to solve developments if in everyday life the concepts and rules they understand are used in everyday life. So students must have their own ability to discover the concepts being studied (Yusuf et al., 2022; Zakwandi et al., 2022). So that students are able to

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solve the problems given better. However, based on the results of the data obtained above, it shows that the average score for conceptual understanding of students in the experimental class is higher than the score in the control class.

The aim of this research is to find out whether there is a difference in the conceptual understanding of students who will be treated with the discovery learning model and classes who will be treated with the conventional model. The six steps in applying the discovery learning model are: first, Simulation, the teacher gives an apperception, second, problem statement, students identify problems and make their own hypotheses, third, data collection, students collect as much relevant information as possible, fourth, data processing, students process the data and information they have. has been obtained, fifth is verification, proof of the initial hypothesis, and finally generalization, drawing conclusions based on the verification results.

The steps in the discovery learning model are overall more influential than the conventional model for the results of students' understanding of concepts. The step that participates in this difference is at the data collection stage because at this stage students play a very active role in finding as many answers as possible in order to find a valid hypothesis from the start, they read relevant literature, and discuss it with their friends. the group so that they are able to answer the problem, and so that they are enthusiastic in finding and answering their own hypothesis. In the experimental class, a final test was given after the material had been taught with question indicators using the discovery learning model. This learning model encourages students to be active in learning on their own to discover concepts and principles. Teachers encourage students to have experience and carry out experiments by discovering concepts and principles for them.

At each meeting, students are given an apperception so that they can make initial hypotheses. Then the teacher gives LKS (Student Worksheets) according to the material being taught. Then the students are divided into several groups, and each group consists of 4-5 people. Then students carry out experiments and find their own answers to their initial hypotheses. After they have finished carrying out the experiment and filling in the worksheet, the final stage is for the group representatives to present the results they have obtained. The teacher as a moderator or companion corrects mistakes in students' answers in presentations or things that are not appropriate.

The research instrument consists of 5 essay questions. Students' ability to understand concepts in physics material after being given the experimental class discovery learning model is higher. Because this class is implemented using a discovery learning model which ensures that students are active in learning and finding their own answers that they have hypothesized from the start. that students learn by actively exploring concepts and principles so that they are encouraged to gather experiences and these experiences help them discover these principles for themselves (Badar, 2014).

The control class uses a conventional learning model with lecture and demonstration methods. After they see the demonstration displayed, the students are asked to respond, then the teacher is active in explaining the material in front of

the class while asking questions and answers, and finally the students work on the questions that have been given according to the teaching material. Using this model encourages students to only listen to the explanation given by the teacher in front of the class and work on questions if the teacher gives assignments. The steps of this method are: 1) the teacher provides material with lectures or demonstrations, 2) the teacher provides questions and answers to students individually, 3) the teacher gives assignments to students individually, 4) students work on the questions on the board write if the teacher gives, 5) the teacher concludes the material that has been taught and makes an evaluation.

Based on the results of the average posttest scores, it was found that there were differences in students' conceptual understanding in the two sample classes. Where the experimental class has an average value of 55.44 and for the control class it is 40.09. This researcher saw that there was an influence of the discovery learning model on understanding concepts, so it could be seen that the class that used the discovery learning model had improvements and high scores compared to the control class that used the conventional model. The discovery learning model is a good model so that students are active in learning and discovering the concepts and principles for themselves and students can think more critically, because students are given the opportunity to discover for themselves and discuss with groups so that it is easier for them to understand the material being taught. . For this reason, it can be said that the discovery learning model influences students' understanding of concepts.

## Conculusion

Berdasarkan hasil analisis data The average value obtained for the learning outcomes of experimental class students using the discovery learning model was 55.44 and the control class was 40.09. This shows that learning using the discovery learning model is influential and very suitable for use in the learning process because this model involves students. in playing an active role in the learning process. And it is highly recommended for teachers to use the discovery learning model so that they can improve student learning outcomes. It is recommended that researchers in the masses who will be able to pay attention to the diversity of students in their initial knowledge and also carry out a good conditioning process before research will be carried out in the future.

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