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# Understanding Dynamic Electrical Material through Discovery Learning: Does it impact learning outcomes?

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**Abstrak**

Penelitian ini bertujuan untuk mengetahui pengaruh model pembelajaran *discovery learning* terhadap hasil belajar siswa pada materi listrik dinamis. Penelitian ini menggunakn jenis penelitian kuantitatif dengan menggunakan metode pra-eksperimental. Populasi dalam penelitian ini terdiri dari seluruh peserta didik kelas XII MIPA di SMAN 13 Bungo tahun ajaran 2023/2024. Sampel dalam penelitian ini berjumlah 33 orang, dimana jumlah siswa sebanyak 18 oramg, sedangkan siswi berjumlah 15 siswi. Pada penelitian ini didapatkan dari hasil nilai ulangan harian siswa pada materi listrik dinamis. Adapun instrumen dalam penelitian ini terdiri dari soal essay dengan berbentuk essay test. Soal tersebut diberikan kepada siswa pada saat melakukan ulangan harian materi listrik dinamis. Berdasarkan hasil ulangan harian siswa data di peroleh nilai rata-rata 72,16 dengan standar deviasi 10,133. Berdasarkan hasil penelitian diatas dapat disimpulkan bahwa model pembelajaran model *discovery learning* tidak berpengaruh secara signifikan terhadap hasil belajar siswa pada materi listrik dinamis. Hal tersebut dikarenakan proses pelaksanaan model pembelajaran discovery belum berjalan secara maksimal sehingga belum mampu memaksimalkan sekaligus meningkatkan hasil belajar khususnya materi listrik dinamis.

**Kata Kunci**: *discovery learning, hasil belajar, listrik dinamis*

**Abstract**

*This research aims to determine the effect of the discovery learning model on student learning outcomes in dynamic electrical material. This research uses a quantitative type of research using pre-experimental methods. The population in this study consisted of all students in class XII MIPA at SMAN 13 Bungo for the 2023/2024 academic year. The sample in this study amounted to 33 people, of which the number of students was 18 people, while the number of female students was 15 students. This research was obtained from the results of students' daily test scores on dynamic electricity material. The instrument in this research consists of essay questions in the form of an essay test. These questions are given to students when doing daily tests on dynamic electricity material. Based on the results of students' daily tests, the data obtained an average value of 72.16 with a standard deviation of 10.133. Based on the research results above, it can be concluded that the discovery learning model does not have a significant effect on student learning outcomes in dynamic electricity material. This is because the process of implementing the discovery learning model has not run optimally so it has not been able to maximize and improve learning outcomes, especially dynamic electrical material.*

***Keywords*** *:* Discovery Learning, Dynamic Electricity, Learning Outcomes

## Introduction

Physics is a branch of natural science that contributes to achieving educational goals (Nada et al., 2022; Wahyuni & Taqwa, 2022). It is a science that emerges and develops through the stages of observation, problem formulation(Misbah et al., 2022; Rahim & Nadira, 2022; Zakwandi et al., 2022), hypothesis preparation, hypothesis testing through experiments, conclusions and exploration of theories and projects (Rosdiana et al., 2019; Sinulingga et al., 2016). It can be said that the essence of physics is a science that studies phenomena through a series of processes called the scientific process, built on the basis of a scientific point of view and presenting the results (Pangesti & Astono, 2018; Serway & Jewett, 2014). Realization as a scientific product includes the three most important processe elements(Masalesi, 2022; Nehru et al., 2022; Ramadhani & Nurita, 2022; Yusuf et al., 2022). Its components are concepts, principles and theories that apply universally (Silaban et al., 2023; Wahyudi, 2021).

Physics teaching should be consistent with the characteristics of science and actively attract students to participate in research. Actively involving students in the scientific research process during the learning process is a basic requirement in learning physics (Adi Prasetya & Tri Harjanto, 2020; M et al., 2022). The hope that physics learning is able to instill and foster habits of independent, creative and critical scientific thinking (N. Amelia & Amelia, 2023; Maya et al., 2023; Sofna et al., 2023) and behavior will have an impact on the role of teachers as teachers shift from conveying knowledge to focusing more on student activities (Ardianto et al., 2019). So students must actively participate in problem solving to find solutions. Therefore, training students to actively solve problems is an asset so that students have the skills to be able to solve problems in everyday life(Adha et al., 2023; Wulansari et al., 2023) and be more independent in pursuing further education.

The 2013 Curriculum learning process is carried out in accordance with a scientific approach. The high school physics subjects set out in the 2013 curriculum are aimed at learning with a scientific approach, namely training students to solve problems systematically and achieving high student learning outcomes (Ibrahim et al., 2020; Verdian et al., 2021). The aim of implementing the 2013 Curriculum is to shape students' skills and character in the form of a synthesis of knowledge(Pramita & Putri, 2023; Sapitri & Indriyati, 2023; Wulandari & Liliani, 2023), skills and attitudes that students can demonstrate in the form of understanding the concepts studied in their own context (Joy, 2014; Loibl & Leuders, 2018) Therefore, this goal is achieved when students are faced with a learning process that includes cognitive processes in problem solving and in the discovery process (Adi Prasetya & Tri Harjanto, 2020; Campisi et al., 2018).

However, the reality is that up to now, teachers' learning in high school has not oriented students towards a learning process that presents contextual problems to discover or solve concepts, theories and principles (Idulog et al., 2023; Pamuji & Mawardi, 2023; Sapitri & Indriyati, 2023; Seftiani & Aulia, 2023). Students can easily master scientific concepts and their environment through observing real life situations (Aldalur & Perez, 2023; Rahmi & Fitria, 2020). The positive impact of implementing a contextual environmental approach is that students can stimulate their curiosity about things in their environment. Therefore, the focus of physics learning is to grow knowledge of basic concepts(Putra et al., 2021; Rafzan et al., n.d.; Zb, Novalian, Ananda, et al., 2021), develop basic skills related to scientific processes, and develop

logical thinking patterns (Harahap & Sihombing, 2015; Loibl & Leuders, 2018).

The Discovery Learning Model is a learning model in which the teacher does not directly provide final results or conclusions about the material he is presenting (S. Amelia & Sukma, 2021; Campisi et al., 2018; Tariyanti et al., 2022). Instead, students have the opportunity to search and find the results of the data(Rozal et al., 2021; Sulman, Yuliati, Kusairi, et al., 2022; Zb, Novalian, Rozal, et al., 2021; Zb, Setiawan, et al., 2021). Therefore, this learning process is something that students must always remember so that the results achieved are not easily forgotten(Zeidler & Nichols, 2009; Zhang & Zhang, 2018; Zheng et al., 2021; Zunicha et al., 2017). Then the discovery learning model is a model that can involve students to actively learn and explore concepts or principles in the learning process (Campisi et al., 2018; Doyan et al., 2021). Apart from that, discovery learning is a learning model that directly involves students in exploring concepts and principles through observation, grouping and drawing conclusions. Therefore, the use of this learning model is given high priority to increase students' motivation and enthusiasm and encourage them to play an active role in the learning process (Joy, 2014; M et al., 2022). With the discovery learning model, it is hoped that it can facilitate the introduction of the learning material provided and improve the quality of student learning outcomes.

The above statement is in accordance with the advantages of the discovery learning model (Chu et al., 2012), namely: 1) Helps students perfect and improve their skills and cognitive processes, 2) Knowledge obtained through this method is very personal and effective because it strengthens understanding, memory and transfer, 3) Can improve abilities solving student problems, 4) Helping students strengthen their self-image so that they gain self-confidence in working together with others, 5) Encouraging students' active participation, 6) Encouraging students to think intuitively and forming their own hypotheses, 7) Training students to learn independently (Aldalur & Perez, 2023; Ornek et al., 2008).

On the other hand, low student learning outcomes are related to the implementation of the curriculum in general. The reasons are several factors, including: 1) the curriculum load is too heavy; 2) affective education is difficult to program explicitly because it is considered part of a hidden curriculum whose implementation is very dependent on the teacher's skills and experience; 3) achieving educational results, especially affective results, takes time and therefore requires educators' perseverance and patience; 4) Evaluating learning outcomes, especially in the affective area, is not easy (S. Amelia & Sukma, 2021; Loibl & Leuders, 2018).

Based on the results of observations conducted by researchers at SMAN 13 Bungo, researchers found that teachers did not involve students enough in solving contextual problems related to physics learning material, especially in understanding basic concepts of physics, which was still relatively low, which had an impact on student learning outcomes which were very low. And researchers also found several problems, such as: 1) students only received information from the teacher, so discovery activities were not carried out in the learning process. 2) Students do not have direct or practical experience. 3) During the learning process, students have not had the opportunity to ask questions, many students appear silent and passive in learning, and students have not expressed their group work attitude for discussion so

that students' knowledge is less developed and this problem will have an impact on the learning outcomes of integrated thematic learning.

Based on the description above, this research aims to describe the influence of the Discovery Learning learning model on elementary school students' learning outcomes in integrated thematic learning.

## Method

The type of research used is quantitative research using pre-experimental methods. The pre-experimental method is a design that includes only one group or class from which the students' daily test scores are obtained. Research methods are basically scientific ways to obtain data with specific purposes and uses. Research methods are basically scientific ways to obtain data with specific purposes and uses.

This research was carried out at SMAN 13 Bungo, Muara Bungo Regency in the 2023/2024 academic year . The population in this study consisted of all students in class XII MIPA at SMAN 13 Bungo, totaling 33 people. The sample in this study amounted to 33 people, of which the number of students was 18 people, while the number of female students was 15 students.

The data in this study were obtained from the results of students' daily test scores on dynamic electricity material. The instrument in this research consists of essay questions in the form of an essay test. These questions are given to students when doing daily tests on dynamic electricity material. Before the instrument is used in research, the questions are first tested. After testing the questions, instrument analysis is carried out, including: validity, reliability, distinguishability , and level of difficulty. The data analyzed obtained values in the form of the average value of daily test results, maximum value, minimum value, and standard deviation value which are used to see students' mastery of concepts in dynamic electricity material.

## Results and Discussion

### Description of Daily Test Results Data

The results obtained from students' daily test scores are presented in the following frequency distribution table:

Table 1. Data on students' daily test scores

| Daily Test Value | |
|---|---|
| N | 33 |
| Min Value | 44 |
| Max Value | 92 |
| Average | 72.61 |
| Standard deviation | 10,133 |

Based on table. 2, it can be seen that the average student test score is 72.61 with the lowest test score being 44, and the highest score being 92. In this way, the average daily test score for students can be said to be sufficient. It can be said that students are quite good at understanding the discovery learning learning model. However, efforts are needed to improve the quality of the learning process, because there are still very low student test scores.

In the learning process, teachers often use learning models that make students less active in learning(Sulman et al., 2023; Sulman, Sutopo, et al., 2021; Sulman, Tanti, et al., 2021). Teachers should use learning models that can encourage students to be more active in learning so that learning takes place more effectively (Reyza et al., 2022, 2023; Sulman, 2019; Sulman et al., 2023; Sulman, Sutopo, et al., 2021; Sulman, Tanti, et al., 2021; Zb et al., 2020). Discovery learning is a learning model that guides students to discover their own knowledge through research, discussion and testing activities so that students are more proactive in learning. By using this learning model, you can measure student learning outcomes in dynamic electricity material.

every appropriate learning model, whatever the name of the learning model, will result in students' interest (Sulman, 2012, 2019; Sulman et al., 2020; Zb et al., 2020) and motivation in learning so that students will be motivated and serious in the process of understanding the material so that they will try to understand the material or master the material better and more professionally (Meiliani et al., 2021; Sulman et al., 2023; Sulman, Yuliati, Kusairi, et al., 2022; Sulman, Yuliati, Purnama, et al., 2022), thereby realizing learning that is not only of high quality but can also be used in everyday life.

**Testing Prerequisites for Analysis and Hypothesis Testing**

**Normality test**

The normality test is carried out to determine whether the data obtained is normally distributed or not. The normality test in this study used Shapiro-Wilk descriptive statistics with the help of IMB SPSS Statistics 22 with a significance level of 5% or α = 0.05. The results of the normality test in this study are presented in the following table:

Table 2. Normality Test Results

| | Kolmogorov-Smirnov [3] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|
| | Statistic | df | Sig. | Statistics | df | Sig. |
| Student Test Scores | .122 | 33 | ,200 | ,974 | 33 | ,106 |

From table 2 it can be seen that the significant value in student test scores is 0.106, which means it is greater than the significant value α = 0.05, so the student test score data is normally distributed.

**Hypothesis testing**

This hypothesis test was carried out on students' daily test scores. Based on the prerequisites for data analysis, it is known that the data from students' daily tests is normally distributed. So hypothesis testing can be carried out using the independent t-test or free sample t-test. The results of calculating students' daily test scores using the t test are presented in the following table:

Table 3. T Test Results of Student Test Scores

| T count | T table α = 0.05 |
|---|---|
| -1,357 | 1,693 |

Based on table 3, the t-test was carried out on students' daily test scores, so the t-count was -1.357 and the t-table was 1.693 at the 0.05 level . Therefore t-count<t-table (-1.357<1.693) means Ho is accepted, and Ha is rejected. Thus, the results of this research show that there is no influence of the discovery learning model on student learning outcomes in learning physics and dynamic electrical material in class XII MIPA SMAN 13 Bungo.

Overall, there are differences in student learning outcomes in the Discovery learning model, students actively develop their abilities in collecting information, managing it, and drawing conclusions (Acuña et al., 1995). Apart from that, in group collaboration, students interact from different backgrounds, have different ways of thinking to be able to solve problems that they solve together so that they can develop students' learning motivation at school and ultimately influence their academic achievement.

Students use the knowledge they already have to support problems, they get answers that are formed by the group or class as a whole. Individual children have varying knowledge, so the knowledge they gain varies on certain topics. Students use existing knowledge to solve problems, they accept answers given by the entire group or class . Each child has different knowledge so

the knowledge they gain will vary on certain topics.

## Conclusion

Based on the research results above, it can be concluded that the Discovery Learning model does not have a significant effect on student learning outcomes in dynamic electricity material. This is proven by the average value of students' daily tests of 72.16 with a standard deviation of 10.133, as well as the results of the t test where tcount < ttable. This is believed by researchers, most likely because the teacher has not taught the discovery model well and perhaps no conditioning was carried out before this model was implemented, so that the students may not understand or comprehend the learning process that is being carried out, so that learning using this model does not run optimally. which resulted in not having a significant influence on student learning outcomes

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