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The Effect of Guided Discovery Methods on Students' Motivation and Learning Outcomes

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Abstract: This research aimed to determine the effect of guided discovery methods on students' motivation and learning outcomes by compare the result on guided discovery method and conventional learning method at MAN 2 Model Makassar. The research method was true experiment with randomized posttest only control group design. The sample of the research were determined randomly by using group random sampling technique and obtained two classes. The first class was the experiment class which was taught by guided discovery method and the second class was control class which was taught by conventional method. Each class consisted of 42 students. The result obtaint that physics learning motivation and physics learning outcome of the students who were taught by guided discovery learning method is higher than conventional learning method.

Keywords: Guided discovery; Physics learning motivation, Physics learning outcome

Introduction

Physics as a basic science has contributed greatly to the progress of science and technology. It is mean the development of technology in all fields that apply the concepts of physics. Physics learning can be done by direct observation through the human senses and indirect observation through appropriate media or tools. Physics concepts are obtained from investigations and discoveries by experts through pure discovery (naturalistic inquiry), then the learning must be in accordance with the method of acquiring the physics concept (Akhfar et al., 2020). To make this happen, an alternative approach is needed that is able to involve the active role of both students and teachers in the learning process.

The physics learning that is suspected to be in accordance with the description above is physics learning with the inquiry method (Purwana et al., 2021). Learning with the discovery method emphasizes the active role of students in learning. The main purpose of inquiry is to develop intellectual skills, think critically and be able to solve problems scientifically (Dimyati et al., 2016). According to Jurmila et al. (2019) discovery process can become a general ability through problem solving exercises, practice forming and testing hypotheses (Jurmila et al., 2019).

The learning success of students in the field of education is also expressed by learning outcomes, but the success of the learning process cannot be separated from the learning motivation of students because each student has different motivations in learning and developing knowledge (Saputra et al., 2019).

Developing knowledge in the field of physics education is crucial to continuously explore effective teaching methods that can enhance students' motivation and learning outcomes. That's why this research is important to do. For example one of the general problem in teaching methods for learning physics commonly used are traditional teaching methods, that rely heavily

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on teacher-centered instruction have been shown to be less effective in promoting active learning and critical thinking skills for students especially on learning physics until they get good performance for learning outcome.

According to Dalyono (2015) the factors that influence student learning outcomes are internal factors and external factors, internal factors are things that come from within students such as health conditions, intelligence and talents, interests and motivation and ways of learning, while External factors are factors that come from outside the students themselves such as family, school, community, and the surrounding environment (Dalyono, 2015).

Based on this general problem, we can give the solution by implementing discovery learning on this research. This learning involves teachers guiding students through problem-solving activities and real-life scenarios, allowing them to connect their learning with practical applications. By integrating guided discovery teaching into the curriculum, educators can shift away from rigid rules and create a more dynamic and positive learning environment. Bahtiar et al. (2022) found that discovery learning using the cognitive conflict approach can improve students' problem skills.

Numerous studies have supported the effectiveness of the guided discovery method. For example, Sinambela (2018) found that students who engaged in discovery-based learning demonstrated a greater understanding. Furthermore, Herdiana et al. (2017) concluded that the use of the discovery method enhanced students' mathematical problem-solving skills. These findings highlight the positive impact of guided discovery learning on students' academic achievement.

In addition to academic benefits, guided discovery learning also fosters independent learning, creative thinking, and motivates students to take ownership of their education. This aligns with the research conducted by Akinbobola et al. (2010), which found that the guided discovery approach effectively enhanced students' achievement and retention in science subjects.

This research was conducted in MAN 2 Model Makassar because we have found some problem on the motivations and learning outcomes students in pohysics learning. The observation result indicated the physics learning outcomes of students at MAN 2 Model Makassar are actually not good, this can be seen from the results of the National Examination of physics subjects students which decreased from 8.39 in 2020 to 7.77 in 2021. Although this school has many things that can support the learning of physics like adequate facilities and superior educator competence, it is still important to maintain and even improve the results that have been achieved in order to produce quality graduates.

The interview result with 5 students that have experience on learning physics, they said if learn physics make bored and difficult to understand the material, because students learn from task and only solving the problem on physics by mathematics formula without clearly concept explanation.

Based on that problem, this study aim to describes the effects of teaching with the guided discovery method which is believed to provide opportunities for students to "discover" something new with the guidance of the teacher. Therefore, Student motivation will increase along with motivations and learning outcomes. According to Sukariasih et al. (2019) discovery method can improve the skill of physics motivation and physiscs scince skill (Sukariasih et al., 2019). The discovery method also can increase the learning interest of students for understanding the physics (Arafah, 2020) and discovery Learning Student is better than conventional Student Worksheets in improving students' Critical Thinking Skills (Andayani, 2020; Maghfiroh et al., 2023; Rizki et al., 2021; Utami et al., 2022).

Method

The method on this research is true experimental research. The research design used is the randomized posttest only control group design, has a control class and an experimental class. The experimental class use the guided discovery learning model, while the control class use conventional learning model, like show in this figure 1.

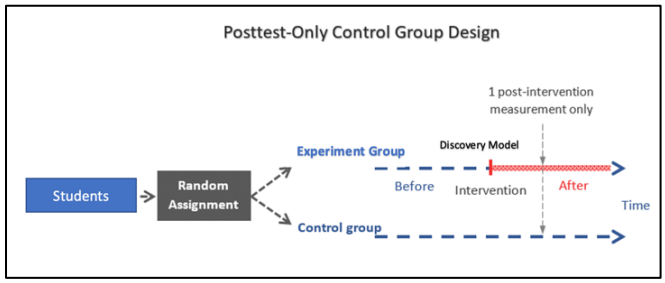

Figure 1. Flowchart of the research method

There are two kinds of independent variables, namely guided discovery methods (experimental class) and conventional methods (control class). The independent variable are students motivation and learning outcome of physiscs, who was determine by implementation of practicum, the difference is that in the experimental class students are allowed to carry out their own practicum according to the LKPD guidelines while the conventional class is fully guided.

Assessment of physics learning outcomes in the cognitive and affective domains is carried out when students are doing practicum. After 4 meetings (4 practicums) students are then given a test of cognitive physics learning outcomes and a learning motivation questionnaire.

The data obtained from the research results were then analyzed by descrictive and inferensial statistics using SPSS software. The research sample consisted of 84 people consisting of two classes that were randomly selected. Class X MIA 4 as the experimental class and class X MIA 5 as the control class.

There are 3 (three) instruments was used, namely (1) a test sheet to measure physics learning outcomes in the cognitive domain, (2) an observation sheet to measure physics learning outcomes in the affective and psychomotor domains, and (3) a questionnaire to measure motivation to learn physics.

Result and Discussion

Based on the results of a descriptive analysis of the motivation to learn physics an average score of 126 was obtained for the experimental class and 119.83. The complete distribution of the sample groups can be seen in Figure 1. The results of the descriptive analysis of physics learning outcomes in the experimental class and control class after treatment can be seen in Figure 2.

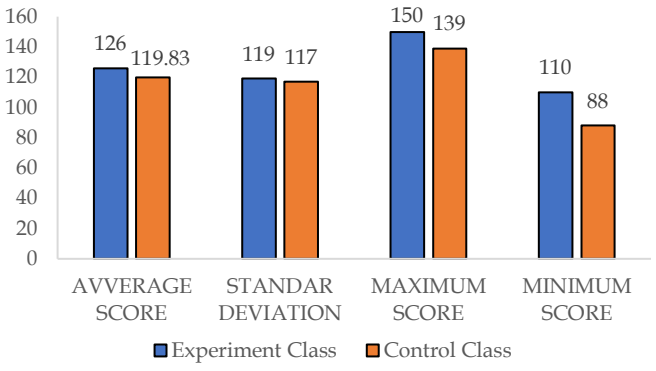

Figure 2. Diagram of result on physics learning motivations

The normality test using Kolmogorov Smirnov on SPPS software has indicated that value of sig <0.05 so the data on this research was normal. The homogeneity test is intended to show that two or more sample data groups come from populations that have the same variance. The results of testing the homogeneity of students' motivation to study physics scores using the guided discovery method and those taught conventionally can be done using the F test statistical formula, it is shown that $F_{count} = 1.31 < F_{table} = 1.69$, it can be concluded that the variance of the data from the two groups (guided discovery and conventional methods) are homogeneous.

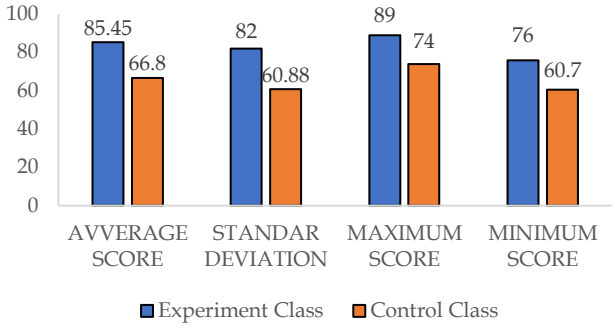

Figure 3. Diagram of result on physics learning outcome

Based on the calculation results in the t-test for inferensial analysis on learning motivations, it is obtained $t_{count} > t_{table}$ (2.30 > 2.02) it mean H_0 rejected and H_1 accepted. This conclude that there are significant differences in motivation to learn physics between students who are taught using the guided discovery method and those who are taught conventionally.

Based on the calculation results in the t-test for inferential analysis on learning outcomes obtained $t_{count} > t_{table}$ (4.93 > 2.02) mean H_0 rejected and H_1 accepted. This conclude that there are significant differences in physics learning outcomes between students who are taught using the guided discovery method and those who are taught conventionally, in this study it is found that the learning outcomes of students who are taught using the discovery method are higher than using conventionally.

Gage and Barlier (Nugraheni et al., 2021) suggest that apart from arising from intrinsic characteristics, motivation can also arise from motivational sources in pay attention, read, and ask questions that must be answered by students. Learning motivation can also increase if educators arouse students' interest, maintain their curiosity, use various learning strategies, clearly state expectations, and provide frequent and immediate feedback.

These things are in line with what is implemented through the guided discovery method where in guided discovery the teacher plays a role in: 1) creating an atmosphere of free thinking so that students dare to explore in guided discovery and problem solving; 2) as a facilitator; and 3) internal mentor solution to problem. The role of students: 1) finding problems and designing alternative solutions; 2) actively seeking information and learning resources; and 3) conclusions and data analysis.

This result is supported by the results of the study of Cavallo et al. (2001) and who investigated 119 biology

students in class X. Cavallo and Laubach found that most of the students who had learning experience with guided discovery planned to continue their education in science majors rather than those taught traditionally. This research then became the basis of Donnell (2013), he later found that students who were taught by guided discovery learning felt more challenged and felt the learning provided was more meaningful than conventionally. Further, Soenarko et al. (2022) found discovery learning is practical and successful for enhancing students' decision-making skills and scientific attitudes.

One of the factors that influence the success of students in learning is the learning method given, choosing the right method will make students more interested and not feel bored in learning. Guided discovery learning is problem-based learning, learning is designed in the form of learning that begins with problems related to the physics concepts to be learned. Learning begins after students are faced with problems, in this way students know why they are learning. They will collect all information through studying teaching materials, laboratory practical work or through discussions with their peers, to be used to solve the problems they found.

By actively involving students in learning, motivation to learn increases, besides that the guided discover method can develop critical thinking students (Yudho et al., 2023). Thus it can improve student achievement (Saputra, 2020). According to Sharif (2012), in his research at a school in the United Arab Emirates suggested that the guided discovery method was very effective in achieving better student learning outcomes.

The research results of Matthew et al. (2013), Payu (2023), and Khairani et al. (2023) also state that the guided discovery method is better than conventional learning in terms of increasing students' cognitive achievement. Guided discovery learning as a constructivist learning strategy helps the development of students in improving their thinking skills when they are interested in problem solving and critical thinking such as solving a concept such as fluid (Jannah et al., 2023).

This instruction leads students to develop meaningful scientific knowledge, builds their conceptualization of science and scientific knowledge such as active learning when facing objective basic questions rather than telling and sharing knowledge by feeding (Brown, 2010). In addition, discovery learning Supervised students direct students to understand questions, seek answers, explain findings, compile and test hypotheses, make conclusions (Yusuf, 2020). In communicative work groups, this will encourage students to think at an optimal level of thinking and ability and direct them to real research.

Students in the experimental class are physically and mentally active in learning situations. Conversely, students in the passive control class only listen to the teacher or follow manual instructions in the laboratory such as manuals or others just to complete their obligations. The activeness of these students does not only concern the concept and content of knowledge but also the ability to solve problems, identify important sources, design and carry out investigations, analyze and interpret data, and most importantly be honest in answering questions or solving problems (Suniasih et al., 2023). Further, Yerimadesi et al. (2022) found guided discovery learning model had a significant impact on the creative thinking skills, This explanation further strengthens that the physics learning outcomes of students who are taught by the guided discovery method are higher than those taught conventionally. This learning outcome is more optimal if only the time to adapt to guided discovery learning is longer.

Conclusion

The conclusions from this study were the motivation students to learn physics taught by guided discovery methods higher than conventionally methods and there are significant differences in motivation to learn physics between students who are taught by using the guided discovery method and those taught conventionally. The learning utcomes on physiscs who was taught by guided discovery are higher than conventionally methods, and there is a significant difference in physics learning outcomes between students who are taught using the guided discovery method and those who are taught conventionally. Its means the guided discovery method has give the positf effect on motivations an learning outcome students on physics.

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Author Contributions

Conceptualization, Fitriani Kadir and I Gede Purwana Edi Saputra; methodology, Fitriani Kadir and Imam Permana.; software, Azmar; validation, I Gede Purwana and Imam Permana.; formal analysis, Fitriani Kadir; writing—original draft preparation, Fitriani Kadir; writing—review and editing, I Gede Purwana and Azmar.

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Conflicts of Interest
This research was conducted entirely based on the ideas and analysis of the issues arising from the research team. Therefore, all authors declare that there are no conflicts of interest contained in this study. All data collection was carried out consciously and objectively, solely for the purpose of analysis and study by the research team.

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