The Effect of Discovery Learning Based on Blended Learning on Student Learning Outcomes at SMA Negeri 1 Boliyohuto

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Abstract- This study aims to determine the effect of the blended learning-based discovery learning model on student learning outcomes on sound waves. This research was conducted in the odd semester of the 2021/2022 academic year. The research method is an experiment using one experimental class and two replication classes. This research was carried out in SMA Negeri 1 Boliyohuto in class XI IPA 1 with a total of 25 students, class XI IPA 2 with a total of 26 students, and class XI IPA 4 with a total of 27 students. The data collection of learning outcomes is based on the test results. Research data analysis using normality test, hypothesis testing, and n-gain test. Based on hypothesis testing, the experimental class obtained t_{count} 5.97 and t_{table} 2.78, replication class 1 obtained t_{count} 7.76 and t_{table} 2.77, and replication class 2 obtained t_{count} 6.25 and t_{table} 2.77. The hypothesis from the three classes H0 received because $t_{count}>t_{table}$. It influences the blended learning-based discovery learning model on student learning outcomes on sound wave material with high n-gain.

INTRODUCTION

Physics is one of the subjects related to national intelligence, which has a significant influence on supporting science and technology. It inspires educators to design and implement education more focused on mastering physics concepts that can support everyday life. However, in reality, many students need help mastering physics concepts. Therefore, it takes problem-solving in every physics material.

Learning is a complex process that occurs in everyone and lasts a lifetime. While learning is a set of actions designed to support students' learning process, taking into account extreme events that contribute to a series of internal events that take place experienced by students (Siregar, 2010). Rambega (2017) states that learning outcomes are the ability to achieve indicators prepared beforehand after teaching and learning activities are carried out. In other words, *learning outcomes* are defined as values obtained after participating in teaching and learning through tests related to cognitive aspects, including elements of memory, understanding, application, analysis, synthesis, and evaluation.

According to Imam et al., (2022), learning and teaching are two things that cannot be separated. Learning refers to student activities, while teaching refers to teacher activities as managers of teaching and learning activities. These learning activities will occur if there is an interaction between students and teachers or students with students. A learning model is needed following the material being taught for the interaction process to follow the desired goals.

Based on the results of observations made by researchers at SMA Negeri 1 Boliyohuto, students' learning outcomes in physics subjects were relatively low. Besides that, based on the results of unstructured interviews with students, most students considered physics subjects uninteresting and affected student learning outcomes. It is because learning physics is more often done by memorizing formulas

and reading books. So, it needs to get special attention for teachers because learning outcomes are one of the factors that can support successful learning. Moreover, a teacher needs innovation in choosing a learning model that can help students be active in the learning process and create a more enjoyable learning atmosphere to achieve a learning goal. One of them is by using the discovery learning model.

Cahyo, (2013) states that, *Discovery learning* involves students in mental activity through exchanging opinions, discussing, reading for themselves, and trying for themselves so that children can learn on their own. One of the advantages of the discovery learning model is changing passive learning conditions to be active and creative. According to Nabila (2018), Discovery learning involves students solving problems to develop knowledge and skills. Moreover, Effendi (2012) stated that Discovery learning is learning that involves students in solving problems for the development of knowledge and skills.

Blended learning is a model that combines the positive aspects of face-to-face and online learning (Subagiyo, 2019). Online learning ensures flexibility that cannot be guaranteed in face-to-face lessons, allowing teachers and students to carry out more effectively, thereby increasing student learning outcomes.

Maulana et al., (2020) state that blended learning is a learning process carried out face-to-face and online, and blended learning is also learning that can utilize various kinds of technological media. With blended learning, students can study independently online. Aeni et al., (2017) stated that Blended Learning integrates face-to-face and online learning. Blended learning is described as a model for learning in which teachers use technology, usually in filling out web-based instructions and daily

assignments or enabling it as the instructor's leading guide. Ramadhani (2020) stated that Blended Learning is a learning process that can utilize various kinds of technology.

The syntax of the revised discovery learning model is Stimulation, Problem Statement, Data Collection, Data Processing, Verification, and Generalization (Syah, 2015)

Discovery learning is a learning process that is not given in its entirety but involves students organizing and developing knowledge and problem-solving skills so that the application of discovery learning models can improve individual discovery abilities. Besides that, learning conditions that were initially passive become more active and creative. So that teachers can change learning that was initially teacher oriented to become student-oriented.

So, to improve physics learning outcomes, teacher strategies are needed in selecting and using learning approaches and learning resources that will be used during the teaching and learning process in class, for example, using effective and appropriate learning models, presenting material that is not boring, interesting, and fun and easy. Understanding and understanding by students will positively affect student learning outcomes. Therefore, students' success in learning also depends on the method of presenting the material provided by the teacher.

RESEARCH METHODS

The research method used is the experimental method, which is a research method used to look for the effect of specific treatments on others under controlled conditions (Sugiyono, 2012). The experimental method used in this study was pre-experimental with a pre-test and post-test design. This design involves two groups:

the experimental group and the replication group.

The subjects of this study were students in class XI IPA I, IPA II, and XI IPA III, who were selected using random cluster sampling with a total of 78 students.

RESULTS AND DISCUSSION
Results

Comparative analysis of student learning outcomes in the experimental class, replication class 1, and replication class 2 is described as follows.
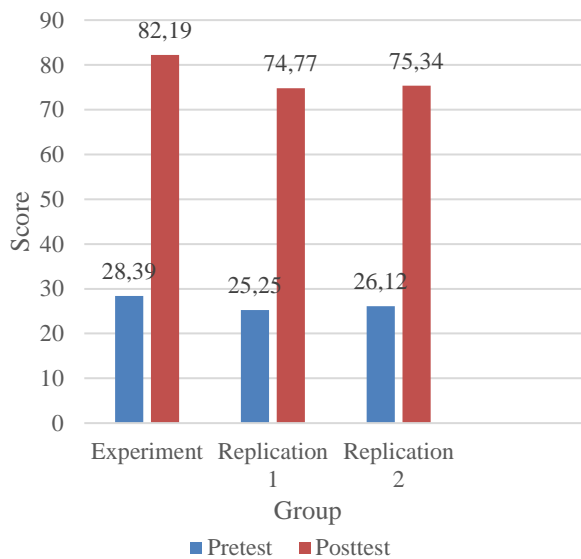

Figure 1. The average value of pretest and posttest experimental class, replication class 1 and class 2

Based on the bar graph in Figure 5, the percentage of learning outcomes in the experimental class, replication class 1, and replication class 2 before being treated was 25% to 28%. Then after being given the treatment, discovery learning based on blended learning increased by 74% to 82%. It is in line with research conducted by Fitri (2020), which states that applying the discovery learning model based on blended learning to students' physics learning outcomes is a significant positive effect.

The results of the data normality test in the three classes, namely experiment, replication 1, and replication 2, along with

the result data obtained from the statistical test, are in Table 2.

Tabel 1. Normality Test Results

Kelas	Fi	K	Status
Ekperiment	0,36	0,26	Distribute Normally
Replication 1	0,38	0,25	Distribute Normally
Replication 2	0,37	0,25	Distribute Normally

Based on the table above, for the three classes, namely the experimental class, replication 1, and replication 2, all have F count $\geq$ K table with a significant level $\alpha = 0.05$. It can be concluded that the research data for the experimental class, replication 1, and replication 2 are distributed normally.

Tabel 3. Hasil Pengujian Hipotesis

Kelas	T_{hitung}	T_{tabel}	Status
Eksperimen	5,97	2.78	H_0 Diterima
Replikasi 1	7,76	2.77	H_0 Diterima
Replikasi 2	6,25	2.77	H_0 Diterima

Based on Table 3 shows the calculation of the hypothesis test; for the experimental class obtained t_{count} was 5.97; for t_{table} obtained 2.78. For class replication 1, the tcount was 7.76; for t_{table} obtained 2.78; for replication 2, the t_{count} was 6.25; and for t_{table} obtained 2.77. Based on the experimental class hypothesis testing, replication 1 and 2, namely $t_{count} \geq t_{table}$ for level $\alpha = 0.01$. Then H_0 is accepted, and H_1 is rejected.

Tabel 4. Hasil Pengujian *N-gain*

Kelas	N-gain	Kriteria
Eksperimen	0,87	Tinggi
Replikasi 1	0,76	Tinggi

Based on Table 4. N-Gain Student learning outcomes obtained for the

experimental class, namely 0.87, are included in the high criteria. For the n-gain analysis of replication class 1, the result is 0.76, which is included in the high criteria. And for the n-gain analysis of replication class 2, the result was 0.76 and included in the high criteria.

Discussion

The learning outcomes data for this study were obtained through a type of learning outcomes test, namely essay questions totaling 10 (ten) items with a total of 78 students as respondents, given to students before and after using the discovery learning model.

Based on Figure 1, the learning outcomes in the experimental class, replication class 1, and replication class 2 before being treated were 25% to 28%. After being treated, discovery learning based on blended learning increased by 74% to 82%. It is in line with research conducted by Fitri (2020), which states that applying the discovery learning model based on blended learning to students' physics learning outcomes is a significant positive effect.

In carrying out this research, the researcher acted as a facilitator in guiding students to understand the sound wave material. The average data on student learning outcomes were obtained through tests, namely for the pretest in the experimental class, to get an average value of 28.39 after being given treatment or treatment in the form of learning using the discovery learning model obtained an average value of post-test results of 82.19. For replication class 1, the average pretest result was 25.25. Then the treatment was given in the form of learning using the discovery learning model; the average post-test result was 74.77. For replication 2, the average pretest score was 26.12, and then another treatment was given using the

discovery learning model to get an average post-test score of 75.34. Based on this description, the average value of the three post-test classes is higher than the pretest average. It is because the application of discovery learning models can improve students' physics learning outcomes. The increase in students' physics learning outcomes is because the Discovery learning model is designed to influence the interaction patterns of students with each other so that they work together in solving the problems they get in a structured manner starting from stimulation, equating problems, collecting data, processing data, verifying back answers that have been compiled or completed. And then conclude with the answers obtained. The results of this study are relevant to research that has been conducted by (Fitri Rezki Astuti, 2020) which states that learning with the discovery learning model can help students to develop thinking skills and develop abilities in solving students' physics problems in this case also has an impact on improving student physics learning outcomes.

In this study, researchers found several obstacles in obtaining data that were passed during research; some online students still needed smartphones, so they borrowed from family members. Then there is the problem of network coverage for online students, which allows students to log out automatically when learning takes place on Google meet. The solution from the researcher is to provide a more detailed explanation through the WA application regarding the discovery learning model as well; if there are obstacles in the learning process, students can communicate with researchers through the groups provided.

The Advantages of the Discovery Learning Model

Some of the advantages of the discovery learning model are: (1) Helping students to develop, readiness, and mastering of skills in cognitive processes; (2) Students acquire knowledge individually so that it can be understood and embedded in their minds; (3) It can generate students' motivation and learning enthusiasm to study more actively; (4) Providing opportunities to develop and advance according to individual abilities and interests; (5) Strengthening and increasing self-confidence because students with a very limited teacher's role.

Disadvantages of the Discovery Learning Learning Model

The disadvantages of applying the discovery learning model are: (1) Students must have mental readiness and maturity and must be brave and willing to know their surroundings well. Sometimes it is tough to make it happen; (2) In situations where the class is fat or has too many students, this method will not achieve satisfactory results. Teachers will find it difficult to pay attention to the learning process of each student; (3) teachers and students who are very used to the old style PBM, this discovery learning method will be disappointing; (4) some critics state that the process in the discovery model is too concerned with the process of understanding only, while it is feared that the development of students' attitudes and skills is less in the spotlight.

CONCLUSION

Based on the research results, learning using discovery learning based on blended learning affects student learning outcomes. This effect can be seen from the significant difference between the pretest and post-test of student learning outcomes in the experimental class, replication class 1, and replication class 2. Where the results of hypothesis testing for the experimental class tcount 5.97 is greater than t_{table} 2.78, replication class 1 tcount 7.76 is greater than t_{table} 2.77. Class 2 replication tcount 6.25 is greater than ttable 2.77. Based on this description, the result of tcount is greater than ttable. So the learning model of discovery learning based on blended learning affects student learning outcomes.

Based on the results of the research conducted, the researcher presents several suggestions that can be developed and considered for future improvements: (1) Learning using the discovery learning model based on blended learning is expected to help teachers carry out learning activities and get the teacher's attention because, with this learning, student learning outcomes can increase, measured through tests. (2) Learning using the discovery learning model based on blended learning is expected to help teachers carry out learning activities and get the teacher's attention because, with this learning, student learning outcomes can increase, measured through tests.

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