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Description of Student Responses Toward Implementation of Discovery Learning Model in Physics Learning

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Abstract

The learning model is one of the strategic approaches that must be carried out by the teacher systematically and procedurally in organizing learning activities to achieve optimal learning goals. In physics, the learning process is still centered on the teacher, in which the teacher still conveys the overall concept on the blackboard, that is not following the 2013 curriculum. This proves that teachers who have not applied the learning model according to the demands of the 2013 curriculum. This research was conducted at SMAN 08 Muaro Jambi on grade X IPA 2 which aimed to determine student responses when they experienced a discovery learning model during the physics learning process. The instrument used was a student questionnaire with a sample of 21 students. This research uses a mixed-method with a sequential explanatory design. Data analysis techniques use descriptive statistics to get the average value, mode, median, minimum, maximum. Based on the results of the study found that the level of student response to the learning model is categorized as good with a percentage of 61.9%.

Keywords: Discovery Learning, Physics Learning, Student Response

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INTRODUCTION

Education is a process for everyone to obtain better knowledge, skills, and attitudes. Efforts in pursuing education are carried out systematically so that an effective atmosphere can be realized and can increase one's potential. Through education, a person can have intelligence, noble character, spiritual strength, and skills which can later be beneficial to the people around him and for himself. According to Astalini, et.al (2019), education is defined as a routine agenda that is very necessary for every human being because education is one of the human means to improve behavior for the better and increase knowledge and experience that can be implemented. The education in Indonesia must be taken in 12 years of compulsory schooling. At present, it is still divided into several levels, for example, Senior High School.

Senior High School is a level of secondary education which is a mandatory requirement for those who wish to continue to the tertiary education stage. At the high school education level, of course, students learn a variety of knowledge, one of the sciences learned is physics subject. The industrial revolution 4.0 has influenced changes in all aspects of life, including the world of education. So, this encourages the education component such as students and teachers to make changes to improve the more optimal learning process (Syahrial, et.al, 2019). Also, to improve the quality of education in Indonesia, it must be supported by improving the quality of its teaching staff (Asrial, et.al, 2019).

According to Kurniawan, et.al (2019), education is an activity that has the purpose of preparing students to be people who have a positive contribution to the community. According to Astalini, et.al (2019), Physics in high school has been studied more deeply and broadly in compulsory subjects for students majoring in science and specialization subjects for social majors namely Physics. According to Putri, et.al (2018), physics learning is based on concepts requires high understanding. Therefore, the physics teacher must understand the material to avoid misconceptions.

Physics is considered one of the important subjects provide students with the provision of scientific knowledge (Kurniawan, et.al, 2019). This student's scientific ability is useful to support the progress of the Industrial Revolution 4.0 era in achieving educational goals, where students are required to be active in analyzing and solving problems that occur in everyday life, especially the application of physics (Darmaji, et.al, 2019). The success of the learning process is influenced by the quality and way of teaching a teacher. Qualified teachers not only know but also have skills (Darmaji, et.al, 2018).

The curriculum as a design in education has a strategic position because the curriculum is used as the teachers' guidance in implementing learning or in the teaching process. The curriculum is a very important tool for the success of educational goals, because an appropriate Curriculum facilitates the achievement of desired educational goals and objectives (Agustin & Sugiyono, 2018). The curriculum, the 2013 Curriculum currently adopted, applies the principle to continuously encourage students to become more active students. In this curriculum, students begin learning in core activities by observing certain phenomena or events so that the teacher can arouse students' curiosity about the phenomenon or event. Therefore, the teacher only acts as a motivator and facilitator, but at the end of the core activity, the teacher also explains the improvement of the student's activities (Supriatna, 2020).

Physics learning in the 2013 curriculum currently emphasizes student-oriented learning (Prabowo & Sunarti, 2015). Innovative physics learning can improve student understanding. Therefore, in this Physics subject, students are required to be able to construct knowledge through scientific activities (Sasmita, 2017). Therefore, the teacher needs to innovate to improve a more interesting learning paradigm. (Rosmah, et.al, 2018). The teacher must design a fun learning strategy or engaging learning model. While currently, learning models that are following the 2013 curriculum are still rarely used in teaching and learning activities. Negative attitudes of students arise because the teacher is too rigid in delivering the material. Besides, the teacher does not vary the media used by each material. On the other hand, the use of learning models in teaching and learning activities is needed so that students are more interested in learning activities.

The learning model is also adjusted to the basic competencies and core competencies in the syllabus. Learning by using discovery learning can improve scientific skills and scientific attitudes of students, whereby carrying out stages such as stimulation, problem statements, and observation students can make a hypothesis and conduct observations, and then at the data collection stage students can make experimental plans. At the data processing stage, students can interpret, communicate, and predict. Then in the verification stage, students can state a conclusion and present it (Yusuf & Wulan, 2015). Each of these stages contains aspects of the process, the process refers to learning that can create enjoyable learning situations and encourage students to actively learn and think creatively (Rosdiana, et.al, 2017).

The results of preliminary research conducted that students' responses to physics subjects still tend to be under expectation. This is evidenced when learning takes place, there are some students not paying attention to the teacher but busy themselves even chatting with his friends. Also, students do not respond to teacher questions and some

students just keep quiet in the learning process. This happens because students do not understand the material presented by the teacher. According to Darmaji, et.al (2019), When a physics teacher candidate does not have process skills, the teacher can only explain the theory with conventional methods during learning process. So, one of the strategies that teachers need to do is to increase innovation in using learning models in line with the demands of the 2013 curriculum, such as the discovery learning model. The discovery learning model is an inductive learning model aiming of helping students to learn concepts and practical analytical thinking skills (Sumarni, 2019). Discovery learning model is a learning model designed in such a way that students can discover concepts and principles through their own mental processes. In finding concepts, students make observations, classify, make conjectures, explain, and draw conclusions to find concepts (Hariyani, 2019). Overall, the discovery learning model activities are expected to be able to develop students' scientific attitudes, especially curiosity, democratic attitudes and academic honesty. With the development of scientific attitudes, students are more enthusiastic about the learning they experience.

Therefore, teachers prefer to keep applying the conventional model in learning physics. Conventional models are considered more effective so that students can easily understand. As a result, the physics learning process is teacher-centered, that the teacher still conveys the overall concept on the blackboard. It does not follow the 2013 curriculum that has been set. This proves that teachers have not applied the learning model according to the demands of the 2013 curriculum, which includes discovery, inquiry, project-based, and problem-based learning models. Therefore, the purpose of this study was to find out how students respond to the application of the discovery learning model when learning physics at SMAN 8 Muaro Jambi and see whether the application of the discovery model has a positive impact on students' attitudes during the implementation of physics learning. The difference between this research and other research is the subject under study. This current study investigated the science students of SMAN 8 Muaro Jambi and the variable used is the discovery learning model in physics learning.

METHODS

This research uses a mixed method with an explanatory sequential design that combines quantitative and qualitative research systematically. According to Maison, Astalini, Kurniawan & Sholihah (2018), explanatory mixed methods designs, namely a combination of research methods combining quantitative and qualitative research methods in sequence. The first stage uses quantitative methods in the form of data and numerical results and continued in the second stage uses qualitative methods in the form of data and text results. In this design, quantitative data and results are more important than qualitative data and results. Therefore, the qualitative method is a supporter in explaining the complete quantitative data obtained.

According to Bazrafkan, et.al (2019), an explanatory sequential mixed method design, which includes a two-phase scheme. In the first phase, the researcher gathers quantitative data and concludes the findings, and in the second, uses the results to design the qualitative part. The general purpose of this project was to collect qualitative data that would help explain in more detail the initial quantitative results and explore them in more depth. Quantitative data in the form of a questionnaire student responses to the discovery learning model consisting of 20 statements and qualitative data in the form of interviews with students.

Quantitative research is one type of research to examine the object of the sample used systematically, planned, and structured using data in the form of numbers. Quantitative data collection using a survey method aims to find a general description of the characteristics of the sample. According to Rukajat (2018), survey method research is one type of research method by taking data in the form of written questions, not oral questions. So that in this study, researchers analyzed, and classified questionnaire data supported by interviews that were narrated to describe the data in full. This agrees with the research of Isnawati, Jalinus & Risfendra (2020), qualitative data is used to strengthen and supplement quantitative data on the problem under study. According to Asrial,et.al (2019), qualitative research is used to explore and compare individuals or groups related to social or human problems.

This study only took certain samples, so it used a purposive sampling technique. According to Heridiansyah (2012), purposive sampling is a sample that is done by taking subjects not based on strata, random, or region but based on the existence of certain objectives. As a result, the sample of this study was only taken from one class which totaled 21 students in Jambi State High School. The study used a test assessment instrument in the form of a questionnaire or questionnaire. The type of instrument used was the student response questionnaire adapted from the Devi (2012). The questionnaire statement in this study uses a 5-point Likert scale. According to Astalini, et.al (2018), the scale used in this attitude questionnaire instrument is a five-point Likert scale consisting of SD "strongly disagree", D "disagree", N "neutral", A "agree", and TA "totally agree". According to Widoyoko (2016) in Hardiyanti, et.al (2018), the choice of the five-scale response was chosen because it has better or more complete response variability than the four scales to be able to express more maximal differences in respondents' attitudes.

A positive statement Likert scale consists of 5 points with the criteria of strongly agree the value is 5, agree is 4, neutral is 3, disagree is 2, and strongly disagree is 1 (Astalini, et.al 2018). The Likert scale negative statement consists of 5 points with the criteria of the value of strongly disagree is 5, disagree is 4, neutral is 3, agree is 2 and strongly agree is 1. Data were analyzed using the SPSS 23 program to obtain the percentage, frequency, and category of student responses. According to Rosana & Setyowarno (2016), descriptive statistics used in researchers are to describe a clear picture of a situation. As for interview data analysis techniques regarding the use of discovery learning models using Miles and Huberman.

RESULTS & DISCUSSION

Results

The renewal of this research is the application of discovery learning models that are used to find out how students respond to the application of the discovery learning model when learning physics at SMAN 8 Muaro Jambi and see whether the application of the discovery model has a positive impact on students' attitudes during the implementation of physics learning.

Table 1. Descriptive statistics of student responses to the discovery learning model

Variable	Interval	Frequency	Percentage (%)	Category
Discovery	20.0 – 36.0	0	0	Very Bad
Learning	36.1 – 52.0	0	0	Not Good
Model	52.1 – 68.0	5	23.8	Quite Good

68.1 – 84.0	13	61.9	Good
84.1 – 100.0	3	14.3	Very Good

Based on table 1. Descriptive statistics of student responses to the discovery learning model obtained data that students are categorized quite good as many as 5 of 21 students with a percentage of 23.8%, students who are categorized as good as 13 of 21 students with a percentage of 61.9 % and students who are categorized as very good as many as 3 of 21 students with a percentage of 14.3%. Based on the results obtained, it can be described that the application of the discovery model at SMAN 8 Muaro Jambi has a positive impact on student attitudes. Therefore, through this approach, it is hoped that students will become more creative, innovative, and more productive in learning physics.

Discussion

One indicator of the success of physics learning goals at the high school level is determined by the accuracy of the learning model used by the teacher when learning physics. This can be seen when students give positive responses to their teacher. According to Suwondo, et.al (2019), the success or failure of learning achievement cannot be separated from the teacher in applying models and methods that can encourage students to learn. The use of a learning model is effective if the application is carried out by the learning objectives (Lidiana, et.al, 2018). The chosen model must be adapted to the subject matter; each material should be delivered in a variety of ways so that students are easily get bored. However, the use of learning models also needs to pay attention to the characteristics of students because high school students tend to have a high enough level of thinking ability and some are low and the mindset is still simple so it needs systematic guidance to be able to improve their thinking ability (Paradina, et.al, 2019).

The used learning model must be able to involve students and find their constructive new concepts (Wartono, et.al, 2018). One example of a learning model that can be applied is the discovery learning model. The discovery-based learning model is defined as a strategy that must be applied by the teacher to create a problematic learning atmosphere, provide stimulus to students by asking questions, motivating students to find their answers, and conducting an experiment. The ultimate goal of the discovery activity can improve student reasoning and train students' cognitive skills by being able to solve the problems they encounter and combine the knowledge they have, to produce new knowledge and be meaningful to themselves (Mubarok & Sulistyo, 2014).

Learning models that involve directly involving students through experiments from the material being studied can make learning more effective and can be more easily stored in students' memories (Khofiyah, et.al, 2019). Discovery learning focuses on the process of discovery, problem-solving, and providing new solutions, so students experience the development of mastery of the concept when uniting new knowledge with prior knowledge (Wartono, et.al, 2019). The discovery dearning model is one of the learning models in the 2013 curriculum that posits teachers as facilitators, so students find their knowledge that they don't know yet with guidance from worksheets and worksheets supplemented with questions by the teacher. New knowledge will stay longer if students are directly involved in the process of understanding and 'constructing' the concepts and knowledge themselves (Mawaddah & Maryanti, 2016).

Discovery learning is a learning model that can shape scientific behavior. The learning process can bring students to solve, analyze, and evaluate a problem, and develop students' curiosity. This is because learning that involves the real world will

make the learning process more meaningful (Nursidik, 2019). This agrees to Danial's research, Gani & Husnaeni (2017), learning by using discovery learning can train students to improve their understanding of critical concepts and thinking skills through observing, asking, trying, reasoning, and communicating them.

The results of the analysis of student responses to the discovery learning model showed the average percentage overall included in the quite good and good category. This shows that physics learning using discovery learning models gets positive responses from students, although some students still show poor responses. The learning process using discovery learning models can increase student activity, students 'courage to express ideas and ideas, and improve students' science process skills in the physics learning process. Interview results obtained from questions about students' responses to Physics subjects after using discovery learning models are as follows:

Question 1 : Do you like studying physics, if you like please explain the reason?

Answer 1 : Sometimes I like to study Physics because it is interesting when the teacher explains it more cheerfully and by studying Physics, I can find out the application of physics we encounter in everyday life, but sometimes I don't like it when the material is difficult to understand.

Question 2 : Do you like learning with experiments or experiments, give reasons?

Answer 2 : I prefer to study physics when doing experiments because it is easier to understand and fun.

Question 3 : Is the discovery learning model more interesting, give reasons?

Answer 3 : Yes, it is interesting, because learning to use the discovery learning model makes my curiosity to find out more deeply the concepts of physics and find problems that can be seen from its application.

Based on the results of the interview students feel interested in learning Physics by using the discovery learning model because it can improve student activity by continuing to find out what is the right solution to solve problems regarding the experiments of Physics material being studied. Also, students can connect the material learned with the phenomena that exist in the surrounding environment because the implementation of physics is often encountered in daily life.

The implementation of good learning can occur if the teacher and students work together in implementing the learning process so that the learning that is carried out can be successful. The success of learning activities can be seen from the increased student learning outcomes. While the use of learning models can increase student learning activities so that students feel responsible for solving problems in the learning process (Nur, et.al, 2019). Based on the principles in the 2013 curriculum, which is encouraging students to play an active role starting with students observing certain phenomena, where the teacher can arouse students' curiosity about the phenomenon. So that in this curriculum the teacher only acts as a motivator and facilitator. However, at the end of the learning activity, the teacher explains to perfect the material from the learning activity. So that the material is delivered correctly and correctly (Parasamya & Wahyuni, 2017).

Therefore, learning by discovery is one technique that can be done to help students create and organize knowledge that involves conscious participation and active inquiry, usually occurring during problem-solving situations (Mirnawati & Rusdiana,

2016). The strategy requires to actively build knowledge, no longer just receive knowledge passively from the teacher. The role of students must be further enhanced in the learning process, ideas that are owned by each student should be raised by the teacher. Efforts are made to support discovery learning by using learning methods that can make students pop up as many ideas as they can (Nurhasanah & Djukri, 2019).

CONCLUSION

Students feel positive toward learning physics when discovery learning is applied. After all, the content material is more fun and easier to understand. This can be proven by knowing the positive responses of students who are categorized well with a percentage of 61.9%. Discovery learning models make students more responsible and have skills in finding, analyzing, and solving problems. As a result, learning physics becomes more meaningful for students and easy to remember every material learned. Based on the above conclusions, it is recommended to make improvements in learning planning using the discovery learning model by each teacher in the high school, especially class X IPA is expected to use the discovery learning model in physics subjects, and for local governments and school leaders to provide support in the learning process that uses discovery learning models to improve student achievement through discovery-based experiments conducted. To increase the activity and science skills of students when learning physics takes place.

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