JURNAL PEMBELAJARAN FISIKA

http://jurnal.fkip.unila.ac.id/index.php/JPF

Vol 7 (2), 2019, 95-102 ISSN: 2302-0105 (p); 2684-9828 (e)

IMPROVEMENT OF PHYSICAL LEARNING OUTCOMES BY APPLYING DISCOVERY LEARNING MODELS IN VOCATIONAL VIBRATION AND WAVES

Florentina Maria Panda*, Albert Lumbu , Elisabet Kuneb

Cendewasih University, Jl. Raya Sentani Abepura Jayapura, Indonesia
**e-mail: florentinamariapanda@fkip.uncen.ac.id*

Received: December 3, 2019 *Accepted: December 30, 2019* *Published: December 31, 2019*

Abstract: Research has been conducted with the aim to find out an increase in learning outcomes by using the discovery learning model of student learning outcomes. This type of research is quantitative with pre-experimental design research methods. The research design used was one-group pretest-posttest. The study was conducted at Jayapura 11 Public Middle School in the 2018/2019 school year. The sample used in this study was class VIIIC, amounting to 30 students. The analysis technique used is the n-gain analysis. The results of research and data processing obtained that there is an increase in student learning outcomes in class VIIIC 11 State Junior High School Jayapura namely the average n-gain value for the vibration concept of 0.65, the wave concept obtained an average n-gain is 0.67, whereas in the concept transverse waves and longitudinal waves, increasing student learning outcomes obtained an average n-gain of 0.69. Based on the learning outcomes of each concept seen an increase but each of these concepts is in the medium category taught by the discovery learning model. Normalized n-gain results for the whole concept are included in the medium category where n-gain is obtained 0.67.

Keywords: Discovery Learning Model, Learning Outcomes, Vibrations and Waves

DOI: http://dx.doi.org/10.23960/jpf.v7.n2.201906

INTRODUCTION

In essence, education can improve the quality of human resources (HR). Besides education plays an important role in development and is an important thing in determining the progress of a nation, so it is not wrong if the government always improves the quality of education. Education is basically very important for needs and cannot be separated from human life. This means that every human being has the right to education and will be expected to develop in it (Aswardi, 2017). Education can be carried out anywhere, one of the institutions that provides education is the school. The school is a place of teaching and learning process that provides formal teaching, which aims to improve the quality of education. In the teaching and learning process at the junior high school level. Learning outcomes can be interpreted as what is expected of students, abilities, or perceived value can be completed in part of learning (Fazriyah, Supriyati, and Rahayu, 2016), said to be successful if students are able to understand and master the subjects taught. While so far the learning process has not reached the learning objectives because not all subjects can be mastered well by students because these subjects are considered difficult. One of the subjects that has been considered difficult by most students is the Science (Physics) subject (Rieber, Tzeng, and Tribble, 2004). Generic science skills can be taught through learning models (Elok, Masykuri and Maridi, 2017). Therefore teachers must determine the right learning model in the learning process in the classroom to improve students' abilities in problem solving. In addition to creating an active and interactive learning process between students and teachers.

Learning models are learning activities that are designed or developed using certain learning patterns. The intended learning pattern can describe the activities of teachers and students in realizing learning conditions or environmental systems that cause the learning process from the beginning to the end of learning. Discovery learning is a mental process where students are able to assimilate a concept or principle, where the mental process is observing, explaining, grouping, making conclusions and so on (Hamdani, 2011: 185). Swaak, Jongw & Joolingenz (2004) stated that discovery learning is one of the learning models in which students take an active role and build their own knowledge base. Discovery learning is an example of a learning context that is intended for the process of knowledge construction (Saab, Joolingen, and Wolters, 2005). Meanwhile, according to Bruner (in Heruman, 2008: 4) discovery is a process, a way / way of approaching problems rather than a product or certain knowledge items. According to Nuryakin and Riandi (2017) in discovery learning, students perform mental operations such as measurement, prediction, observation, inference and grouping. By using this learning model students are expected to be able to develop their thinking skills and to find solutions to a given problem.

Based on the results of surveys and interviews with VIII grade teachers in January 2019 at SMP N 11 Jayapura there are several factors that are suspected to be the causes of physics learning outcomes of low students, including lack of attention and learning is still focused on the teacher when learning takes place. This is because the teacher is not optimal in directing learning in accordance with the interests and talents of students, so students are not confident in developing the ability to solve problems, and the use of learning models used by teachers is less varied in the process of

delivering subject matter so that it causes students to tend to feel bored and bored during the learning process.

Researchers suspect that the low value of student learning outcomes, due to not yet implemented various learning models in the classroom. To introduce effective discovery learning, a number of studies have been carried out to help students with specific strategies from specific aspects of the learning process (Reid, Zhang, and Chen, 2003). The teacher as the only source of learning for students. This makes student learning outcomes low (Martaida, Bukit and Marlin, 2017). These problems make researchers interested in using discovery learning models in learning. The reason for using this model is because the Discovery learning model is a learning model that emphasizes the discovery of concepts or principles previously unknown to teaching and problem solving skills, followed by strengthening skills. In the condition of discovery learning, there is no teacher intervention outside of objective learning suggestions; there are no guiding questions and no feedback about the quality of material selection, exploration, or self-assessment (Klahr and Nigam, 2004). Hosnan (2014: 282) states that discovery learning is a model for developing active learning by self-discovery, self-inquiry, and the results obtained will last long in memory. Through discovery learning, students can also learn to think through analysis and try to solve their own problems. This opinion indicates that the theory of discovery (discovery learning) has a close relationship with learning outcomes. Based on the above problems, the researchers conducted a study on Improving Physics Learning Outcomes By Applying Discovery Learning Models to the Subject of Vibrations and Waves.

METHOD

The research method used in this study is a quantitative research method with Pre experimental designs. Research design is a design carried out by researchers. The form of design used in this study was one group pretest-posttest design, before conducting the treatment the researcher gave an initial test (Pretest) and at the end of the treatment the researcher gave a final test (Posttest). This research was conducted in class VIII even semester 2018/2019 school year at Jayapura 11 Public Middle School. The implementation time is expected from January to May 2019 in the 2018/2019 school year. The population in this study used all students of class VIII consisting of seven classes, namely class VIIIA, VIIIB, VIIIC, VIIID, VIIIE, VIIIF, VIIIG, amounting to 227 students. The sample used to represent the population in this study was class VIIIC consisting of 33 students. Determination of the research sample by cluster random sampling and the selected class is class VIIIC.

In this study there are two variables, namely the independent variable and the dependent variable. In this study, the measuring instrument used to collect data in the form of tests or non-tests. To filter variable data the use of discovery learning models is used non-tests (questionnaire) and for student learning outcomes used tests. Student learning outcomes tests use multiple choice, while the questionnaire uses a Likert scale. The data analysis technique used is the correlation analysis technique using the Pearson product moment correlation test and regression analysis. However, before being analyzed the data was tested for normality using Chi Square to find out whether the data was normally distributed or not.Methods can be written in sub-sections, with sub-subheading. Subtitles do not need to be given a notation, but are written in lowercase

letters beginning with a capital letter, Times New Roman-12 unbold, left flat. For example, you can see the following.

RESULT AND DISCUSSION

1. Analysis of Average N-Gain for Each Concept

a. Concept of Vibration

The results of the n-gain analysis on the vibration concept are presented in Figure 1 below:

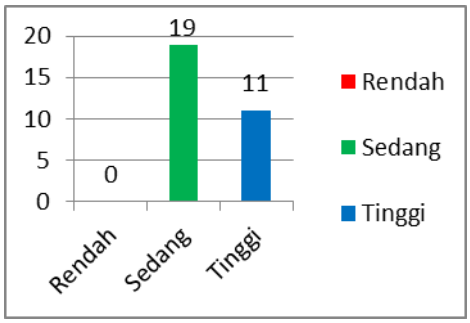

Figure 1. n-gain diagram on the concept of vibration

From Figure 1 the n-gain results on the concept of vibration, where the high category is 11 students, the medium category is 19 students, and the low category is not out of 30 students in class VIIIC. The average n-gain for the concept of vibration is 0.65 in the medium category.

b. Wave concept

The results of the n-gain analysis on the wave concept are presented in Figure 2 below.

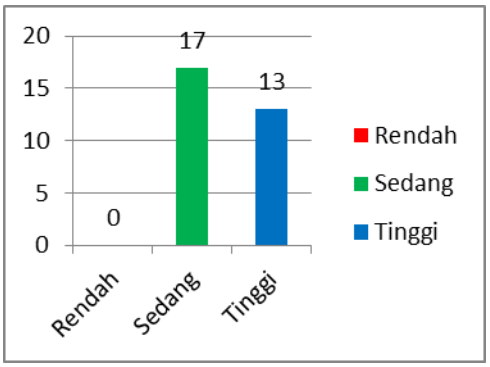

Figure 2. Diagram of the n-gain wave concept

From Figure 2, the n-gain results on the concept of waves, where the high category is 13 students, the medium category is 17 students, and the low category is not out of 30 students in class VIIIC. The average n-gain for the concept of vibration is 0.67 in the medium category.

c. Concepts of Transverse Waves and Longitudinal Waves

The results of the n-gain analysis on the wave concept are presented in Figure 3 below:

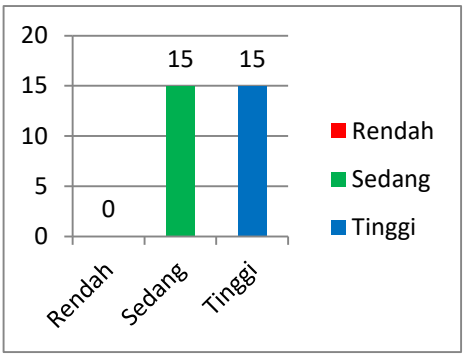

Figure 3. Diagram of the n-gain wave concept

From Figure 3 we get the results of n-gain on the concept of transverse waves and longitudinal waves, where the high category is 15 students, the medium category is 15 students, and the low category is none of the 30 students in class VIIIC. The average n-gain for the concept of vibration is 0.69 in the medium category.

2. Results of Average N-Gain Analysis of All Concepts

Based on the results of research conducted in Jayapura 11 Public Middle School, researchers conducted a study conducted in January-April 2019. Thus, based on the results of the pretest and posttest conducted in class VIIIC vibration material and waves of the initial and final stages of learning showed an increase in learners which is summarized in figure 4.

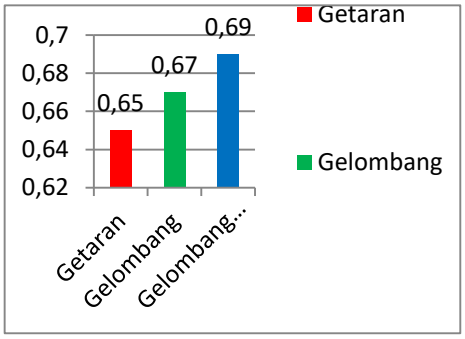

Figure 4. Learning Outcomes of Average N-gain of Each Concept

From the results of the n-gain calculation the increase in learning outcomes on the concept of vibration obtained an average n-gain of 0.65 and classified as a medium category. The data shows that the discovery learning model is good enough to be used to improve student learning outcomes on the concept of vibration. In the wave concept, the average n-gain is 0.67. The value of increasing student learning outcomes is included in the medium category, this means that the discovery learning model is good enough to be used to improve student learning outcomes. While on the concept of transverse waves and longitudinal waves, an increase in student learning outcomes obtained an average n-gain of 0.69 included in the medium category. Discovery learning model is quite good to be used in teaching the concepts of transverse waves and longitudinal waves.

Based on the diagram, the average learning outcomes of each concept appear to be increasing, but each of these concepts is in the moderate category taught by the discovery learning model. This research is in accordance with research conducted by Nasrullah (2016) which revealed that the use of discovery learning can improve students' cognitive competence. Besides this research is also in line with research by Farhatani (2014) which states that the use of discovery learning methods can improve the cognitive aspects of students' competencies. The difference in improvement in learning outcomes is due to the number of different item items for each concept. The vibration concept is in the medium category and has 9 item items. The wave concept is included in the sadang category and has 8 question items. Whereas the concept of transverse waves and longitudinal waves in the medium category has 8 item items. The difference in n-gain in each concept is caused by several factors, namely the psychological condition of the students and the environmental conditions at the time the implementation of the learning activities are taking place.

Based on table 4 of the results of n-gain learners all concepts that have been given treatment, a pretest score of 2.06 and a posttest score of 6.3 in order to obtain an increase in the value of learning outcomes of students taught with the discovery learning model experienced a pretty good increase. The average value of n-gain overall concepts obtained is 0.67 in the medium category. So researchers assume that students will begin to get used to the activities carried out by providing pretest and posttest, so the value of increasing the medium category will be a high category. Therefore teachers in teaching and learning activities must be able to develop effective and efficient learning models by applying discovery learning models where this learning model requires active students to experiment to find their own subject matter learned through a daily science problem proposed by the teacher at the beginning of learning.

According to Akinbobola (2010) which states that the discovery learning model should be used by teachers to develop student learning outcomes. This learning encourages students to develop learning outcomes on vibration and wave material such as observing the results of experiments, classifying different types of waves, making experimental hypotheses, planning experiments, using tools and materials during experiments, communicating, and summarizing experimental results.

CONCLUSION

Based on the results of the study it can be concluded that there is an increase in student learning outcomes which is quite good by using discovery learning models in

each concept obtained an average n-gain for the concept of vibration 0.65, the concept of waves obtained an average n-gain is 0.67, while in the concept of transverse waves and longitudinal waves, an increase in student learning outcomes obtained an average n-gain of 0.69. Based on the learning outcomes of each concept seen an increase but each of these concepts is in the medium category taught by the discovery learning model. Normalized n-gain results for the whole concept are included in the medium category where n-gain is obtained 0.67.

ACKNOWLEDGEMENTS

Thank you to the Dean of the Teaching and Education Faculty of Cenderwasih University and to the ladies and gentlemen who helped so that this research went well and smoothly.

REFERENCES

Aswardi 2017. The implementation of guided discovery learning methods to improve student learning outcomes at the electromagnetic control system and operation course. The International Journal of Counseling and Education Vol.2, No.2, pp. 85-91.

Klahr, David., Nigam, Milena. 2004. The Equivalence of Learning Paths in Early Science Instruction: Effects of Direct Instruction and Discovery Learning. Vol.15, No.10, pp. 661-666.

Khabibah, Elok Norma., Masykuri, Mohammad., Maridi. (2017). The Effectiveness of Module Based on Discovery Learning to Increase Generic Science Skills. Journal of Education and Learning. Vol. 11 (2) pp. 146-153.

Hamdani (Ed). 2011. Teaching and Learning Strategies. Bandung: Loyal Reader CV.

Heruman (Ed). 2008. Mathematics Learning Model in Elementary Schools (Ramdhani Boyke, Ed). Bandung: PT Remaja Rosdakarya.

Hosnan, M. 2014. Scientific and Contextual Approach.

Ministry of Education and Culture. 2013. Teacher Training Materials, Curriculum Implementation

Nasrullah, D. (2016) Learning Discovery Learning Method in Elementary Electronics Subject Class X Audio Video Engineering SMK Muhammadiyah 1 Bantul. Essay. Yogyakarta: Faculty of Engineering UNY.P.152

Nuryakin and Riandi. 2017. Improving Middle School Students' Critical Thinking Skills Through Reading Infusion-Loaded Discovery Learning Models in the Science Instruction. Journal of Physics: Conference Series 812 (2017) 012003

N. Fazriyah. 2017. The Effect of Integrated Learning Models and Critical Thinking Skills of Science Learning Outcomes. Journal of Physics: Conference Series 812 (2017) 012014

Prasetianto, D. 2017. Research on the Influence of the Use of Discovery Learning Models on Learning Outcomes. Bandar Lampung: Lampung

Tota Martaida., Nurdin Bukit., Eva Marlina Ginting. 2017. The Effect of Discovery Learning Model on Student's Critical Thinking and Cognitive Ability in Junior High School. IOSR Journal of Research & Method in Education (IOSR-JRME). Vol 7, Issue 6 pg 2

Reid, D.J., Zhang, J., Chen, Q. 2003. Supporting Scientific Discovery Learning in A Simulation Environment. Pg 10.

Rieber, Lioyd P., Tzeng, Shyh-Chii., Tribble Kelly. 2004. Discovery Learning, Representation, and Explanation Within A Computer-Based Simulation: Finding the Right Mix. Learning and Instruction. Vol 14, p. 307.

Saab, Nadira., Joolingen, Wouter R. van., Walters, Bernadette H.A.M. van Hout. 2005. Communication In Collaborative Learning Learning. Page 603.

Swaak, Janine., Jong, Ton de., Joolingen, Wouter R. van. 2004. The Effects of Discovery Learning and Expository Instruction on The Acquisition of Definitional and Intuitive Knowledge. Journal of Computer Assisted Learning. Page 226.