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THE INFLUENCE OF STEAM-BASED PROJECT-BASED LEARNING MODELS ON STUDENTS' LEARNING OUTCOMES IN CLASS IV ENERGY TRANSFORMATION MATERIAL AT MIN 6 BIREUEN

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Abstract

The importance of choosing a learning model. A good learning model can be used to make the teaching and learning process more effective, meaningful and enjoyable. So that students will get learning outcomes that can meet the minimum completeness criteria (KKM). But the fact is that teaching and learning in class is still not optimal in using learning models. Based on these problems need an update. One of the meaningful, effective, and fun learning alternatives that can be applied in developing student competencies is to use the STEAM-based project based learning model. The formulation of the problem in this study is "Does the STEAM-based project-based learning model affect student learning outcomes in class IV energy transformation material at MIN 6 Bireuen". The purpose of this study was to determine the effect of the STEAM-based project based learning model on student learning outcomes in class IV energy transformation material at MIN 6 Bireuen. This study uses a quantitative approach. This type of research is quasi experimental design. The population in this study were all MIN 6 Bireuen students while the samples were all 20 grade IV students. Data collection techniques used tests, while data analysis techniques used SPSS Statistics 25 by using normality tests and to test hypotheses using paired sample t-tests. The results showed that the significance value (2-tailed) on the test was 0.000 <0.05, where the average value of the learning test results was 85.5. The average value obtained by these students can fulfill the KKM. So it can be said that there is an influence of the STEAM-based project-based learning model on student learning outcomes in energy transformation material.

Keywords: Project Based Learning Model, Energy Transformation, Learning Outcomes.

INTRODUCTION

Education is a process for a person to acquire knowledge, understanding, and ways of behaving according to needs (Muhibbinsyah in Ilyasin 2010:30). The purpose of education is to form and produce human resources with quality output. These educational goals can be achieved with an increase in the quality of an education.

Educators play a role as creators in the process of teaching and learning activities. Educators are guided to be able to develop a curriculum so that they can create a conducive learning atmosphere and conditions, namely an interesting, fun learning atmosphere and are able to provide space for students to be active, creative and innovative in integrating knowledge, exploring the abilities and skills of students (Albaar, 2020: 18).

Educators must also be able to improve literacy, numeracy, and science competence in students. This is necessary in the learning process because it is very influential for the students themselves. Many of the students who are able to read but cannot understand the reading. Therefore efforts to improve literacy, numeracy and science competence need special attention because in reality the quality of education in Indonesia is quite low.

Based on the results of the Programmer for International Student Assessment (PISA) survey in 2018, scores for Indonesian students' reading, mathematics and science abilities were 371, 379 and 396 with Indonesia in 75th position out of 80 countries participating in the survey (Mullis et al., in Amelia, 2022: 292). The results of the PISA survey show that the condition of Indonesian students in literacy, mathematics and science is in a lower position.

From the results of my observations there are still many teachers at MIN 6 Bireuen who are still not optimal in using learning models. Teaching and learning activities at MIN 6 Bireuen still use conventional learning. Conventional learning places more emphasis on students' mastery of concepts, verbal, theoretical learning, with the idea that this learning can be applied later in various contexts. The activities carried out in the classroom are very monotonous, starting with the teacher delivering the material, a question and answer session about the material that has been explained, then students are required to do the assignments the teacher has given. Conventional learning is less effective for students so that it can affect student learning outcomes.

Based on these problems need an update. Various ways have been carried out by the government to improve the quality of education, namely the development of learning models, the development of learning media, upgrading for educators and the provision of infrastructure for learning (Ida in Jagattara, 2014: 2). The government has now facilitated the task of educators to be able to implement it into teaching and learning activities so as to improve the quality of education.

To be able to improve the quality of education, you can start from small things but have a big impact, educators can start by finding out various kinds of learning models so that educators can adapt to the conditions of students and the material to be taught. To achieve the learning objectives, educators are required to be able to understand the model to be implemented, along with this, educators also need to think about the learning model to be used. Lots of learning models that have been created are very effective for the process of teaching and learning activities. One of them is the project based learning (PJBL) learning model.

The project based learning model is a learning model that provides opportunities for educators to manage learning in the classroom by involving project work (Suryani, 2017: 80). Project work contains complex tasks based on problems or driving questions as a first step in integrating new knowledge based on their experiences and guides students to carry out activities of designing, solving problems, making decisions, carrying out investigative activities, and providing opportunities for students to be able to work individually or in groups.

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Students find out and respond to interesting questions, problems or challenges so that they can provide new experiences and knowledge as future provisions for students. Project based learning is also based on the belief that students can process

and remember new knowledge more effectively when students are able to create a project from the relationship between academic lessons and the real life context they experience, their own experiences and environment. From the experience gained by these students can be built into knowledge, or in the world of education it is known as constructivism, where students can construct their own knowledge.

STEAM is an acronym for Science, Technology, Engineering, Art and Mathematics. Integration of STEAM will be able to provide opportunities for students to carry out the learning process directly and produce products with good creativity and problem solving abilities (Buinicontro in Nurhikmayati, 2019: 42). STEAM learning is an indisciplined approach that studies concepts with the real world that apply the principles of Science, Technology, Engineering, Art and Mathematics (Aditya, et al in Amelia, 2021: 292). In the STEAM approach, students are trained to improve their high order thinking skills, logic and collaboration so that their curiosity to ask questions will grow. In STEAM students are used as the center of learning while the teacher is only a facilitator for students.

Science learning in elementary schools is still not optimal because educators are less able to use learning resources so that teaching and learning activities in the classroom become very boring. This causes science learning outcomes to be less than optimal. To get maximum learning outcomes, students must be able to build their own knowledge. By using the STEAM-based project-based learning model, science learning becomes more meaningful because students can gain experience directly without having to guess again about the material to be studied.

STEM-based project-based learning is a learning model in which students are organized into groups to complete projects that integrate science, technology, engineering, art and mathematics. STEM-based project based learning places more emphasis on the process of designing or prototyping. The STEAM-based project based learning learning model, students are directed to the real world as a context to train high order thinking skills and skills to find problem solving by identifying the purpose of the problem and finding solutions to problems. This is in line with previous research which explains that STEAM-based project-based learning needs to be applied in learning because it can help students improve problem-solving skills, by using the STEAM-based project-based learning model it can create fun learning at school so that schools can produce participants. students who have quality output (Putu Lely Somya Prabawati, Gusti Ngurah Sastra Agustika, 2020).

Based on the above background that has been stated by the researcher, the researcher is interested in conducting research with the title "The Influence of STEAM-based Project Based Learning Learning Models on Student Learning Outcomes in Class IV Energy Transformation Materials at MIN 6 Bireuen".

The formulation of the problem in this research is "The effect of the STEAM-based project-based learning model on student learning outcomes in class IV energy transformation material at MIN 6 Bireuen" Based on the background explanation above, the formulation of the problem in this research is Is the project-based learning model STEAM-based learning influences student learning outcomes in class IV energy transformation material at MIN 6 Bireuen?

RESEARCH METHODS

This study uses quantitative research. Quantitative research can be interpreted as research based on the philosophy of positivism, used to examine certain populations or samples, collecting data using research instruments, analysis is quantitative/statistical, with the aim of describing and testing established hypotheses (Sugiyono, 2017).

This study uses an experimental approach, namely quasi-experimental design. Research that uses an experimental approach can be interpreted as a research approach used to find the effect of certain treatments. In this quasi-experimental design study only used the experimental group because the control group was difficult to obtain (Sugiyono, 2017: 114).

The instrument or measuring device in this study is a test that contains items to be given to students. The test is given to obtain data about the STEAM-based project-based learning model for student learning outcomes. The test questions consist of 20 multiple choice questions with 4 answer choices for each question.

Data collection techniques are a way of collecting the data needed to answer the research problem formulation (Sugiyono, 2017). From the theory above, it can be concluded that data collection techniques are methods used by researchers to collect the data needed in research. In this study, researchers used data collection techniques in the form of tests. The test is conducted in written form which consists of 20 multiple choice questions with four alternative answers. The test will be carried out at the end of the lesson with the aim of being able to find out the extent to which students

understand the energy transformation material that has been studied using the STEAM-based project based learning model.

DICUSSIONS AND RESULT

MIN 6 Bireuen which is located at Jl. Monkelayu Samuti Makmur, Geurugok, Bireuen became the schools studied. The data that has been obtained is the learning outcomes of students or test scores from students in class IV, totaling 20 students. The data was obtained after the learning process of energy transformation material in the science subjects.

This research was conducted in 2 meetings. On the first day of the study, it took place from 10:00 to 11:20. On the second day of the study it lasted from 11:40 to 12:30.

Where at the 1st meeting the researchers carried out the process of teaching and learning activities about energy transformation using the STEAM-based project based learning model then continued with students working on projects that had been designed. At the second meeting the students continued to work on the project that had been designed with their group of friends, then the students presented the results that had been done and continued by giving test questions to find out the students' understanding after the teaching and learning process was complete. The data collected can be seen as follows.

Based on research data that has been obtained in class IV MIN 6 Bireuen on energy transformation material in the Science and Technology subject, it shows that the data that has been analyzed has an influence when using the STEAM-based project based learning model. We can see this from the results of the learning tests that have been obtained by students in class IV where the average score of the learning test results is 85.5. The average value obtained by these students can meet the minimum completeness criteria (KKM).

The learning outcomes of these students can be seen from the tests given to students after the process of teaching and learning activities using the STEAM-based project based learning model is complete. The test given is in the form of multiple choice questions totaling 20 questions with 4 answer choices for each question.

The research lasted for 2 meetings which were conducted by the researcher himself. At the first meeting the researcher started the class by asking questions to stimulate students and the task of the students here was to discuss the answers to the questions with their group mates. It turns out that there are still many students who

still don't understand about energy transformation. Therefore, the researcher displays a video about energy transformation while explaining the video that is shown.

In the next activity, students design projects with their group of friends and schedule projects to be worked on. The class atmosphere became very active, students exchanged ideas to design projects they would make. After designing the project students begin to work on thread lanterns with the project designs that have been made. Starting from gluing all the parts in the balloon then wrapping the thread around the balloon. In this activity students work together to work on thread lanterns with their group mates because this activity requires cooperation so that the thread lantern pattern can be formed properly and does not take a long time.

At the second meeting the students continued to make thread lanterns. For this meeting, the lantern pattern has been formed. Now the task of the students is to design the desired character with their group mates. After the thread lanterns were finished, the next task for the students was to present the thread lanterns they had made. After all the groups have presented their thread lanterns. Next, the researcher gave test questions to students to find out the extent to which students understood the energy transformation material that had been studied using the STEAM-based project based learning model.

The application of STEAM in teaching and learning activities on energy transformation materials, namely:

1. Students will know the nature of objects, changes in the form of objects, and energy transformation (Science).
2. Many things that are used by students while in class are assisted by technology such as the use of stationery, tools and materials to make lanterns then the infocus is used to show energy transformation videos (Technology).
3. Students are able to design thread lantern projects, then design the character of the lanterns to be made (Engineering).
4. Students are able to show creativity used to design thread lantern characters (Art).
5. Able to solve problems that occur during the process of making thread lanterns (Mathematics).

During the process of teaching and learning activities taking place, it is very clear that students are able to find a solution to a problem, such as a string lantern which turns out to be unsuccessful because the balloon inside is shrinking and also the liveliness of the students which makes the class atmosphere fun.

This is in line with previous research which explained that STEAM-based project based learning needs to be applied in learning because it can help students improve problem-solving skills, can create fun learning at school so that schools can produce students who have quality output (Putu Lely Somya Prabawati, Gusti Ngurah Sastra Agustika, 2020).

CONCLUSION

Based on the results of research that has analyzed the data, the results of data analysis using the paired sample t-test obtained a significance value (2-tailed) of 0.000 <0.05. With the results of the learning tests that have been obtained by students in class IV where the average value of the learning test results is 85.5, the average value obtained by these students can meet the minimum completeness criteria (KKM).

According to the hypothesis testing guidelines, if the significance value (2-tailed) is 0.000 <0.05 then Ho is rejected and Ha is accepted. So that the hypothesis obtained is "there is an influence of the steam-based project based learning learning model on student learning outcomes in class IV energy transformation material at MIN 6 Bireuen" can be accepted.

Based on the research results that have been obtained from this study, there are several suggestions from researchers as follows:

1. It is hoped that the school will provide support to teachers to be able to apply the STEAM-based project based learning model so that learning becomes more enjoyable at school so that schools can produce students who have quality output.
2. It is hoped that teachers will be able to apply the STEAM-based project-based learning model to learning. The use of the STEAM-based project based learning model can also train high order thinking skills in students, train the ability to find problem solving from a problem, and make learning fun.
3. It is hoped that future researchers can choose populations with more varied objectives so that they can answer the issues raised thoroughly.

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