SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATIC (STEM) APPROACHES IN SCIENCE LEARNING IN ELEMENTARY SCHOOL

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Abstract

The formulation of the problem in this study is "Can the STEM approach improve learning outcomes for science content theme 6 sub-theme 2 class IV SDN 13 Limboto?". With the aim of research to improve student learning outcomes using the STEM learning approach on the theme of 6th grade 4th grade science students at SDN 13 Limboto, totaling 12 students. The indicator for the success of the action is indicated by a minimum of 90% of student learning outcomes reaching the KKM score. Based on the results of the study, it was shown that the application of the STEM approach to the fourth-grade students of SDN 13 Limboto could improve student learning outcomes and student project outcomes. Student learning outcomes have increased after the action in the first cycle is in the form of learning activities using the STEM learning approach. In the first cycle increased to 66.7%. Student learning outcomes increased in the second cycle to 91.7%. which means in the second cycle increased 25%. Thus, it can be concluded that using the STEM learning approach can improve learning outcomes on science content in class IV SDN 13 Limboto.

Keywords: Approach, STEM, Learning Outcomes, Science Learning

Preliminary

In the 2013 curriculum, learning must be based on student activities and apply a scientific approach. Where the scientific approach consists of 5 M, namely: observing, asking, gathering information, reasoning, and communicating. In the implementation of the 2013 curriculum, it gives the teacher the flexibility to choose the desired teaching model, especially the learning model must lead to 21st century learning, with the aim that teachers are more creative and can also develop according to the demands of k13. This is done recognizing the need to make curriculum changes in preparation for the needs of the 21st century, including an emphasis on new skills (Lavi, Tal, Dori, 2021).

Learning in elementary schools uses the principle of learning to play while learning. However, in reality, elementary school students' playing time has decreased. Where they spend a lot of time learning to read and write arithmetic (calistung) rather than learning through exploration, exercising and using imagination. Students observe with all senses to classify, predict, and communicate, so they can find other points of view. The learning environment of school children should support their entire development.

In the 2013 curriculum the strategies used include a scientific approach with problem-based learning models, discovery learning and project-based learning. There are three things that the curriculum will achieve, namely, character, competence and literacy. In terms of character, it is expected that students will be able to deal with a constantly changing environment. Elementary school teachers experience problems in learning science due to the lack of media, facilities and infrastructure in the development of science as well as the diverse understanding of teachers in understanding the concepts of science that exist around children. For this reason, media, facilities and infrastructure are needed for easy and inexpensive child development in Indonesia as well as science learning tools for science concepts around students which can be one of the references for elementary school teachers in learning.

Science and mathematics learning in elementary schools is generally only theoretical and not yet applicable, mostly only the application of formulas, even though in everyday life many problems are solved by means of science and mathematics. So learning science and mathematics must be problem-based and students learn to communicate, either in writing or orally. This causes the level of achievement of the Minimum Completeness Criteria (KKM) for Science and Mathematics subjects in schools is still relatively small. This is evidenced by the fact that of the 12 students, only 3 students were able to achieve the KKM. The specified KKM is 75. When calculated in percentage form, only 3 students complete or 25%, while those who do not complete reach 9 or 75%. This is certainly a serious problem for teachers to immediately find solutions to solve problems. To further improve the ability to solve problems, especially in improving mathematics, one way to achieve this is with Science Technology Engineering and Mathematics (STEM).

The description of the problem shows that it is necessary for teachers to carry out reforms in the learning approach in order to improve student learning outcomes. One of the good learning approaches used by students is the STEM approach. The choice of a learning approach must take into account the circumstances of students and be adjusted to the needs in realizing educational goals. The selection of the right learning approach leads the teacher to the quality of effective and enjoyable learning for students. but not all learning approaches can be applied to all subjects. This is influenced by the characteristics of the subject.

One form of education reform can be carried out using a learning approach that can assist teachers in creating experts, namely the STEM (Science, Technology, Engineering, and Mathematics) approach. This STEM approach is an approach that refers to the four components of science, namely integrated science, technology, engineering, and mathematics (Nasrah, Amir, Purwanti, 2021) (Amir, 2019). STEM (Science, Technology, Engineering, and Mathematics) has been widely advocated and applied in education, because it is considered to have a great impact on students' interdisciplinary learning, which can be seen as a significant driving force for the progress of a country. in scientific and technical knowledge, innovation, economics, and international competitiveness (Hsu Chan Kuo, Yuan-ChiTseng, Ya-Ting Carolyn Yang, 2019).

Improving the quality of education in Indonesia can be done through the implementation of education reform. Changes that occur in traditional learning towards learning that further enhances critical thinking are called educational reform. One form of education reform can be done by using a learning approach that can assist teachers in creating experts, namely the STEM approach. This STEM approach is an approach that refers to four components of science, namely: knowledge, technology, engineering, and mathematics. In line with this, research shows that the application of STEM can help develop knowledge, help answer questions based on investigations, and can help students to create new knowledge (Khoiriyah, Abdurrahman, Wahyudi, 2018).

STEM is an acronym for science, technology, engineering, and mathematics. The word STEM was launched by the US National Science Foundation in the 1990s as the theme of the education reform movement in these four disciplines to grow the workforce in STEM fields, develop STEM literate citizens, and increase US global competitiveness in science and technology innovation. (Hanover Research, 2011). This STEM education reform movement was driven by study reports showing a shortage of candidates to fill jobs in STEM fields, a significant level of literacy in society on STEM-related issues, and the position of achievement of US high school students in TIMSS and PISA. (Roberts, 2012) (Kurniawan, 2018).

Method

This research is one of the Classroom Action Research (CAR). According to Kemmis Classroom Action Research (CAR) is a form of self-reflection carried out by researchers (participants) in social situations, including educational situations aimed at improving the actions taken by the researchers themselves. This research was conducted at SDN 13 Limboto. Students who are subject to action in this study are grade IV students. This school is located in Hepuluwa Village, Limboto District, Gorontalo Province.

In this research, there are 4 stages of research in each cycle, namely the action planning stage, the implementation stage, the evaluation stage and the reflection stage. The type of data in this study is quantitative data in the form of learning outcomes tests and qualitative data in the form of learning implementation taken through observation sheets.

The data analysis technique in this study used several assessment instruments, namely: (1) teacher observation sheets used to observe and assess aspects of learning carried out by teachers, (2) written tests to determine students' science learning outcomes on the material that had been taught, and To find out the extent to which the action can produce the desired change by the researcher.

The data that has been obtained from data collection regarding learning activities in each cycle uses the criteria of very good (SB), Good (B), Enough (C), Less (K). To find out the level of mastery of the lessons absorbed by students, a test is needed.

Discussion

This classroom action research is about improving student learning outcomes through the STEM learning approach. This research was carried out in two cycles and each cycle consisted of 4 stages, namely planning, implementation, monitoring and evaluation, and reflection. This implementation is in accordance with the classroom action research (CAR) model proposed by Kemmis & MC, Tagrrat, where classroom action research consists of 4 steps which are included in the first cycle, but if in cycle 1 it has not been successful, the researcher has the right to reflect and continue to cycle next.

In the implementation of the actions, both Cycle I and Cycle II, student learning outcomes were observed from the beginning of the activity to the end of the learning activity using the teacher's

activity observation sheet instrument consisting of 30 aspects, the student activity observation sheet consisting of 18 aspects and evaluation at each meeting 2 in each -each cycle.

Based on the results obtained from the first cycle of the first meeting, it was found that 6 people were complete in the aspect of learning outcomes with a percentage of 50% and the remaining 6 people were categorized as incomplete with a percentage value of 50%. This shows that it is not optimal. So at the stage of the first cycle of the first meeting, reflection still needs to be done so that it can improve science learning outcomes, while in the first cycle of the second meeting it was found that 8 people had completed with a percentage of 66.7% and the rest were not completed as many as 4 people with a percentage of 33.3%. So at the stage of Cycle I, the Second Meeting, reflection still needs to be done so that it can improve science learning outcomes, continued in cycle II.

In the second cycle of the first meeting, there has been an increase in students' science learning outcomes, with the result that 12 students already have high science learning outcomes. This can be seen in the assessment of learning outcomes which began at the beginning to the end of learning that in the second cycle of the First Meeting there were 10 people who were categorized as complete with a percentage of 83.3%, while 2 people were categorized as incomplete with a percentage value of 16.7%. While in the second cycle of the second meeting, there were 11 students who completed with a percentage of 91.7% and the remaining 2 students did not complete with a percentage of 8.3%. This shows that in the second meeting there was an increase of more than 90% so that in the second cycle, the second meeting could be said to have been optimal. By using a real level of 100%. Based on the research that has been done, starting from the learning outcomes, cycle I to cycle II can be seen in the following millestone image.

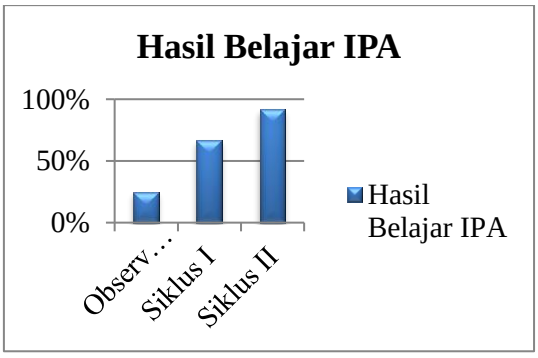

Figure 4.7 Science Learning Outcomes

Thus, it can be concluded that science learning theme 6 about the material of complete metamorphosis and imperfect metamorphosis animal cycles in class IV SDN 13 Limboto, Gorontalo Regency is carried out using the STEM approach can improve student learning outcomes and can improve project aspect assessment. So the hypothesis in this study is "if the teacher uses the STEM approach, then student learning outcomes in science subjects in class IV SDN 13 Limboto increase".

Closing

Based on the results of the study, it can be concluded that science lesson theme 6 using the STEM learning approach can improve the learning outcomes of fourth grade students at SDN 13 Limboto, Gorontalo Regency.

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