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Efforts to Improve Students' Skills of MA Al Karim Central Bengkulu with Ethnoscience Learning Concept of Physics

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Abstract

This community service project aims to optimize the learning process by implementing ethnoscience-based physics instruction at MA Al Karim Bengkulu Tengah. The goal is to address the limitations of facilities and infrastructure that hinder the learning process, ultimately enhancing students' skills, knowledge, and academic performance. The program is carried out in several stages. The first stage involves an initial observation at MA Al Karim Bengkulu Tengah to obtain a detailed understanding of the school's conditions. The second stage includes outreach and coordination with the principal, teachers, and especially the physics teachers. The third stage involves providing skill training for the teachers on the concept of ethnoscience, which is then applied directly to the students during the learning process. The final stage consists of regular evaluations and mentoring involving MBKM students and physics teachers to ensure that the community service activities bring about improvements in the learning process. Through the ethnoscience training at MA Al Karim Bengkulu Tengah, it is hoped that both teachers and students will be able to enhance their skills and optimize the learning process despite the existing limitations in facilities and infrastructure. Based on the outcomes of this program, it can be concluded that the training had a positive impact on teachers' skills by utilizing the ethnoscience concept, which leverages the cultural diversity and local traditions of the community, even in the face of limited facilities and infrastructure. Ethnoscience concept can be very useful on improving learning activity at the school and also will enhance the learning experience.

A. Introduction

Science process skills are a teaching approach that focuses on the way that the material is presented and understood, in learning process skills, students must be active (Asy'ari & Fitriani, 2017). Learning skills cannot be separated from learning concepts. Both are continuous lines that are always related. Learning concepts emphasizes the appreciation of concepts while process skills emphasize the acquisition and understanding of facts and principles. Learning process skills is impossible if there is no material to be learned (Demirçalı & Selvi, 2022). Conversely, learning concepts will not occur if there are no process skills in each student who learns. These facts are included in developing science process skills and scientific attitudes in students.

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Local wisdom is a form of human behavior and its relationship with the surrounding environment that is naturally formed and sourced from customs and advice of ancestors. In general, local wisdom emerges through a long internalization process and lasts for generations as a result of interactions between humans and their environment. This long process of value evolution leads to the formation of a value system that is crystallized in the form of customary laws, beliefs, and local culture (Dewi et al., 2022).

As time progresses and technology develops, so must knowledge. Knowledge development efforts are not only carried out by scientists and experts who are experts in their fields. More than that, the most important thing that needs to be applied is to explore the potential of scientific knowledge in the culture that develops in society. Exploring and understanding the potential of science that produces a logical understanding is needed to avoid misinterpretation of the local wisdom of the culture that develops in the region. MA AL KARIM is one of the educational units with an MA level in Sidodadi, Pondok Kelapa sub-district, Central Bengkulu district, Bengkulu. In carrying out its activities, MA AL KARIIM is under the auspices of the Ministry of Religion, where the facilities and infrastructure are still inadequate, causing the learning process to be less than optimal. However, students at MA Al Karim have a background of cultural diversity and local community traditions. The diversity of local cultures and traditions is a challenge as well as a means to train students' skills and knowledge in ethnoscience-based physics learning.

Ethnoscience is a combination of the word "*ethnos*" which comes from Greek, meaning nation, and "*scientia*" from Latin which means knowledge (Fitria & Widi, 2018; Khusniati et al., 2023). In general, ethnoscience refers to the knowledge possessed by a community or nation, which studies the knowledge system and cultural mindset of a particular society and highlights the uniqueness of the nation's knowledge (Fasasi, 2017; Zainal et al., 2024). The scope of ethnoscience includes science, agriculture, ecology, medicine, and flora and fauna (Harefa, 2017; Solheri et al., 2022). Ethnoscience is an activity of transforming indigenous science which consists of all knowledge about community facts derived from hereditary beliefs and still contains myths (Pratama et al., 2023; Sari et al., 2024). The birth of ethnoscience is inseparable from the knowledge discovered by trial and error and the absence of the ability to translate the findings into scientific knowledge. This is because the starting point of ethnoscience is at the local to regional level as a form of trial and error knowledge (Lightner et al., 2021; Socrates et al., 2021).

Based on the background above, to optimize the learning process at MA AL KARIM, the implementation of ethnoscience-based physics learning can be done considering the lack of available infrastructure to support the learning process and skills. In addition, this ethnoscience-based learning training is expected to increase the role and function of management, especially teachers and principals so that the learning process can be supported by appropriate policies and by conditions in the field.

B. Methods

This activity is carried out in several stages, the first is the initial observation to MA AL Karim Bengkulu Tengah to get a detailed description of the current conditions. Things that will be observed are the availability of adequate classrooms, the number of students, and additional facilities and tools that may have to be prepared first. Secondly, there was socialization and coordination with the principal, teachers and especially physics teachers. This activity is held on October 7, 2024 and it involved about 25 participant. This stages Socialization and coordination are carried out to provide a complete picture of the steps, stages and facilities that must be prepared in the implementation of the service. Third, the training of science process skills through the concept of ethnoscience for teachers and implementing ethnoscience-based learning for students in the classroom. In this session, the training was carried out in the form of presentations by speakers, discussions, and practices. The last stage, namely evaluation and mentoring, is carried out periodically by involving MBKM students and subject teachers. This evaluation is carried out to ensure that the service activities provide changes to the learning process for the better, this will be seen in motivation and activity in learning.

C. Result and Discussion

Researchers carried out a series of methods to obtain research data results and an overview of the community service process. Skills provision was carried out to teachers at MA Al Karim in the form of material presentations and discussions on ethnoscience-based learning.

Figure 1. Socialization with Principal and Teachers

After the socialization session on ethnoscience-based learning, then the application of ethnoscience activity skills is carried out. Ethnoscience-based learning can be done by approaching existing local cultures. In the research of Sahara et al. (2022) to overcome the limitations of physics practicum equipment they made an alternative ethnoscience-based learning on temperature and heat material by connecting one of the local cultures in Bengkulu, namely batik activities on Besurek cloth. The existence of these local cultural values increases students' interest and motivation in learning science at school. One example of the implementation of socialization carried out in community service at MA AL Karim is the use of traditional tools such as *mortar* to explain the concept of force and motion, and the use of bamboo to understand sound resonance.

Figure 2. Ethnoscience-based learning for students

1. Improved Understanding of Physics Concepts

The results of this activity showed a significant increase in the understanding of physics concepts after the implementation of ethnoscience learning to students. Before the implementation of the activity, students' understanding of physics concepts was on average in the medium category. However, after the activity, there was an increase with an average understanding score that rose by about 20%. Tests conducted before and after the activity showed an increase in the average score of 20%. Students became more sensitive in linking local phenomena with the physics theories learned. Ethnoscience provides a more relevant context for students, so they are more motivated to learn, according to the findings Prahani et al (2023) regarding the use of physics concepts in local wisdom as an effective learning resource.

2. Students' Skills in Connecting Science and Local Culture

Students' comprehension of physics ideas can be strengthened with the use of basic teaching aids based on locally available resources and technology. Sahara et al. (2022) demonstrate how teaching tools composed of basic elements like stone, bamboo, and wood can help students become more proficient in the scientific method. For instance, in this service, students learn about torque, momentum, and center of mass using conventional equipment. Due to their direct involvement in measurements and observations, these technologies not only help students better understand physics ideas but also enhance their experimental abilities. This backs up study on the value of basic teaching tools in enhancing students' KPS.

Through the ethnoscience approach, students can more easily relate physics phenomena to their local culture. Examples applied are the use of traditional tools such as *mortar* to explain the concepts of force and motion, and the use of bamboo to understand sound resonance. Students realize that many simple technologies in everyday life are in line with the scientific concepts learned.

3. Improved Science Process Skills

This activity also focuses on science process skills which include observation, classification, interpretation and communication. After the implementation of the ethnoscience learning model, students' skills in making observations and experiments improved significantly. Students were able to make observations and interpret experimental results better, with the average process skills score increasing by about 15%. Science process skills that include observation, classification, interpretation and experimentation also showed improvement. Students were able to conduct simple experiments related to physical phenomena in their environment, such as the use of local wisdom in measuring the strength of force on traditional tools.

4. Student Participation and Enthusiasm

Students' enthusiasm in participating in learning has also increased. This can be seen from their high participation in group discussions and experiments. They are more active in finding connections between local phenomena and the physics concepts they learn, thus fostering high curiosity.

5. Increased Student Motivation and Curiosity

With the ethnoscience approach, students' motivation to learn physics increases. They are more enthusiastic in learning because the material is closer to their daily lives. Contextualized learning helps students understand that science does not only exist in the classroom but also in their cultural and life activities.

Despite the positive results, there were some challenges faced during the implementation of this activity, such as the lack of teacher training in integrating ethnoscience concepts into the curriculum. To overcome this, there is a need for collaboration between academics, cultural experts, and educators in developing relevant teaching materials.

D. Conclusion

Community service with the theme "Efforts to Improve the Skills of MA Al Karim Central Bengkulu Students with Ethnoscience Learning Concepts in Physics" has succeeded in improving understanding of physics concepts, science process skills, and student learning motivation. The ethnoscience approach proved to be effective in linking scientific knowledge with the local cultural context, so that students more easily connect physics phenomena with their daily lives. Students' enthusiasm and engagement in learning increased significantly. However, challenges in implementation mainly lie in the lack of teacher training and limited resources, so collaboration between educators, academics, and cultural experts is needed for better implementation. Suggested that the involvement of experts from various disciplines is important to develop programs that support ethnoscience teaching.

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