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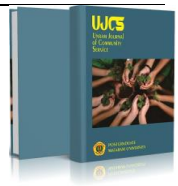

Optimizing Ethnophysics-Based Deep Learning Strategies to Improve the Quality of Teaching in SMA Negeri 8 Ambon

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Abstract: This community service program aimed to enhance teachers' pedagogical competence by introducing ethnophysics-based deep learning strategies and diagnostic assessment practices through socialization activities at SMA Negeri 8 Ambon. The program was implemented using a discussion-based approach that encouraged teachers to share classroom experiences, identify instructional challenges, and collaboratively explore contextual teaching strategies. The activity focused on strengthening teachers' understanding of deep learning principles, which emphasize critical thinking, conceptual understanding, and meaningful learning, as well as the development and use of diagnostic assessments to identify students' prior knowledge and misconceptions. The results indicated that teachers gained improved understanding of student-centered learning approaches and recognized the importance of integrating local cultural contexts into physics instruction to enhance relevance and engagement. Participants also developed practical insights into designing diagnostic assessment instruments and using assessment data to inform instructional decisions. Active discussions revealed increased teacher awareness of reflective teaching practices and the value of collaboration in professional development. In conclusion, the program effectively supported teachers in adopting more contextual and meaningful teaching practices. The integration of ethnophysics-based deep learning and diagnostic assessment is expected to improve instructional quality and contribute to better student learning outcomes.

Keywords: Ethnophysics, Deep Learning, Diagnostic Assessment, Teacher Professional Development.

Introduction

Improving the quality of teaching is a key factor in enhancing students' learning outcomes and developing meaningful educational experiences. In recent years, educational reforms have emphasized the importance of deep learning approaches that encourage students to develop critical thinking, problem-solving skills, and conceptual understanding rather than relying solely on memorization (Fullan et al., 2018). Deep learning in education focuses on engaging students actively in the learning process, enabling them to connect theoretical knowledge with real-life contexts. Therefore, teachers play a crucial role in designing learning environments that support deeper understanding and meaningful learning experiences.

One approach that can support deep learning in science education is the integration of local knowledge and cultural contexts into teaching practices. Ethnophysics, which connects physics concepts with local cultural practices and indigenous knowledge, provides a contextual learning framework that can make abstract scientific concepts more relevant and understandable for students (Aikenhead & Ogawa, 2007). By incorporating local wisdom, traditional technologies, and community practices into physics instruction, teachers can help students see the relationship between scientific principles and their everyday lives. This contextual approach not only

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improves conceptual understanding but also strengthens students' appreciation of local culture and knowledge systems.

In many regions, however, teachers still face challenges in implementing contextual and innovative teaching strategies. Limited exposure to ethnoscience-based learning models and insufficient professional development opportunities often hinder teachers from integrating culturally relevant approaches into their classrooms (Rahmawati et al., 2022). As a result, physics learning frequently remains abstract and disconnected from students' real-life experiences. To address this issue, professional development programs that introduce ethnophysics-based learning strategies are necessary to enhance teachers' pedagogical competence.

Socialization activities, such as workshops, seminars, and training sessions, are effective methods for disseminating innovative educational approaches and strengthening teachers' instructional capacities. Through structured socialization programs, teachers can gain knowledge about ethnophysics concepts, learn how to design deep learning-oriented lesson plans, and develop strategies to integrate local cultural contexts into physics learning (Desimone & Garet, 2015). These activities also provide opportunities for collaborative learning among teachers, allowing them to share experiences and best practices in implementing contextual teaching approaches.

Therefore, this program aims to optimize ethnophysics-based deep learning strategies to improve the quality of teaching through socialization activities for teachers. By introducing teachers to the integration of ethnophysics and deep learning principles, this initiative is expected to enhance teachers' pedagogical skills, promote culturally relevant physics instruction, and ultimately improve students' learning experiences in science education in SMA N 8 Ambon.

Method

The implementation of this activity was designed as a socialization and discussion-based program aimed at improving teachers' understanding of ethnophysics-based deep learning strategies in classroom practice. The activity involved school teachers as participants and was conducted through an interactive discussion forum in which teachers were encouraged to share their experiences, challenges, and instructional practices related to physics and science learning in schools. This approach was chosen to create a participatory learning environment where teachers could actively reflect on their teaching practices and collaboratively explore alternative strategies that support deeper conceptual learning. Discussion-based professional development is considered effective because it allows teachers to connect theoretical knowledge with practical classroom situations and encourages reflective teaching practices (Desimone & Garet, 2020).

At the beginning of the activity, participants were invited to describe the current learning conditions in their schools, including the difficulties they face in implementing student-centered learning and integrating contextual examples into physics instruction. Teachers shared various issues encountered in classroom learning, such as students' low conceptual understanding of physics concepts, the dominance of teacher-centered instructional methods, and the limited use of local cultural contexts as learning resources. These discussions provided an overview of the real conditions experienced by teachers and became the basis for identifying instructional needs and potential improvements in teaching strategies.

Following this initial discussion, the speaker responded to the issues raised by the participants by explaining the principles of deep learning in education and its relevance to improving the quality of teaching. The explanation emphasized that deep learning encourages meaningful learning experiences where students actively construct knowledge through inquiry, critical thinking, and contextual problem solving (Fullan et al., 2021). In this context, teachers play an important role in designing learning activities that connect scientific concepts with students' real-life experiences. The discussion also highlighted how the integration of ethnophysics can serve as an effective strategy to contextualize physics learning by linking scientific concepts with local cultural practices, traditional technologies, and community knowledge.

The Ethnophysics approach introduced during the activity focused on identifying local cultural phenomena that can be explained using physics concepts. Through examples and case discussions, participants were encouraged to analyze everyday cultural activities within their communities and relate them to scientific principles. This approach allows teachers to present physics concepts in a more contextual and meaningful manner, thereby improving students' engagement and conceptual understanding. Integrating local knowledge into science learning has been shown to enhance students' scientific literacy and help bridge the gap between scientific knowledge and cultural understanding (Sudarmin et al., 2021).

Throughout the socialization process, the speaker facilitated open dialogue by responding to questions and providing practical suggestions on how teachers can implement ethnophysics-based deep learning strategies in their classrooms. Participants were encouraged to reflect on their existing teaching practices and explore ways to incorporate culturally relevant examples into lesson planning and classroom activities. The discussion

also emphasized the importance of collaborative learning among teachers, as sharing experiences and strategies can support continuous professional development and innovation in teaching practices.

By using a discussion-oriented socialization method, this activity aimed to create an interactive professional learning environment that supports teachers in understanding and applying ethnophysics-based deep learning strategies. The combination of reflective discussion, problem identification, and expert explanation provided teachers with both conceptual insights and practical ideas for improving the quality of physics teaching in their schools. Such collaborative professional development activities are essential for strengthening teachers' pedagogical competence and promoting the implementation of contextual and meaningful science learning.

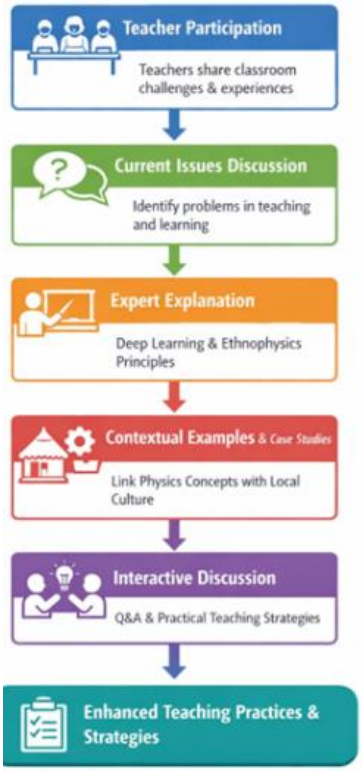

Figure 1. Stages of Community Service Activities

The flowchart illustrates the stages of the socialization activity aimed at improving teachers' understanding of ethnophysics-based deep learning strategies. The activity begins with teacher participation, where teachers share their experiences and challenges in classroom learning. This stage allows participants to identify common problems related to teaching practices and student engagement in physics learning.

Next, the speaker explains the principles of deep learning and the ethnophysics approach as strategies to improve the quality of teaching. Deep learning emphasizes meaningful learning experiences that encourage critical thinking, active participation, and contextual understanding (Fullan et al., 2021). In this context, ethnophysics connects physics concepts with local cultural knowledge and everyday community practices to make learning more relevant for students.

The activity continues with interactive discussions and question–answer sessions, where teachers explore possible ways to apply ethnophysics-based deep learning in their classrooms. Through this process, teachers reflect on their teaching practices and gain new insights into implementing contextual and meaningful physics learning (Desimone & Garet, 2020; Sudarmin et al., 2021).

Result and Discussion

The community service activity conducted at SMA Negeri 8 Ambon aimed to enhance teachers' understanding of deep learning principles and the use of diagnostic assessment in classroom instruction. The activity was attended by teachers who actively participated in a series of presentations and discussions designed to strengthen their pedagogical knowledge and practical teaching skills. The session began with the presentation delivered by Anastasija Limba, who explained the concept and principles of deep learning in education. During the presentation, participants were introduced to the importance of designing learning experiences that encourage students to develop critical thinking, conceptual understanding, and the ability to connect knowledge with real-life situations. Deep learning emphasizes meaningful learning processes in which students actively construct knowledge rather than simply memorizing information, and this approach is increasingly recognized as an important strategy for improving the quality of education (Fullan et al., 2018).

In the presentation, the speaker emphasized that teachers play a crucial role in facilitating deep learning by creating learning environments that support inquiry, collaboration, and contextual problem solving. Teachers were encouraged to design instructional activities that engage students in exploring concepts, discussing ideas, and applying knowledge to real-world contexts. Such learning environments help students develop higher-order thinking skills and promote deeper conceptual understanding, which are essential competencies in modern education (Hattie, 2017). Participants showed strong interest in the discussion, particularly regarding how deep learning principles can be applied in science and physics learning, where students often encounter abstract concepts that require contextual explanations.

The implementation of the community service activity also revealed several important insights regarding teachers' perceptions of innovative learning

approaches. During the discussion session, many teachers expressed that one of the main challenges in classroom learning is encouraging students to actively participate in the learning process. Teachers reported that students often tend to be passive during lessons, particularly in subjects that involve abstract concepts such as physics. This condition indicates that instructional approaches still tend to focus on content delivery rather than on developing students' conceptual understanding and critical thinking skills.

The discussion also highlighted that many teachers have limited experience in systematically identifying students' misconceptions before starting the learning process. In many cases, teachers begin instruction without first exploring students' prior knowledge, which may result in misunderstandings that persist throughout the learning process. Diagnostic assessment plays an important role in addressing this issue because it allows teachers to detect learning difficulties early and adapt their teaching strategies accordingly. Studies show that identifying students' misconceptions at the beginning of instruction helps teachers design more targeted interventions and improves students' conceptual development (Treagust & Chandrasegaran, 2022).

Another important finding from the activity was the teachers' interest in integrating contextual learning approaches into classroom instruction. Several participants explained that connecting scientific concepts with real-life examples can significantly improve students' motivation and understanding. However, teachers often experience difficulties in finding appropriate contextual examples that are relevant to students' daily experiences. Through the discussion, the speakers encouraged teachers to explore local cultural practices and everyday phenomena as learning resources. Integrating local contexts into science learning has been shown to increase students' engagement and make scientific concepts more meaningful, particularly when students can relate the material to familiar situations in their environment (Rahmawati et al., 2022).

Furthermore, the interaction among participants during the activity demonstrated the importance of collaborative learning among teachers as part of professional development. Teachers shared experiences about strategies they had used to address learning difficulties and discussed possible improvements to their instructional approaches. Such collaborative exchanges are valuable because they allow teachers to learn from each other's experiences and develop innovative teaching practices. Professional learning communities that encourage discussion, reflection, and knowledge sharing are known to contribute significantly to improving teaching quality and instructional effectiveness (Admiraal et al., 2021).

The activity also strengthened teachers' awareness of the importance of reflective practice in teaching. Through the discussion sessions, teachers were encouraged to evaluate their current teaching methods and consider how new strategies could be integrated into their classroom practice. Reflective teaching practices help educators continuously improve their instructional approaches and adapt them to the evolving needs of students. Research indicates that reflective practice enables teachers to develop a deeper understanding of their instructional decisions and fosters continuous professional growth (Loughran, 2023).

In addition, the enthusiasm shown by the participants throughout the activity indicated that teachers have a strong interest in professional development opportunities that are practical and directly related to classroom challenges. Many participants expressed that training activities that include real case discussions and practical examples are more beneficial than purely theoretical explanations. This finding suggests that future professional development programs should continue to incorporate interactive discussions, case analyses, and collaborative activities in order to maximize teachers' engagement and learning outcomes. Effective teacher training programs should provide opportunities for teachers to apply new knowledge in practical contexts and reflect on their experiences (Philpott & Oates, 2022).

The next session was delivered by Erlin Eveline, who presented material on the preparation of diagnostic assessment instruments and their implementation in classroom learning. In this session, participants were guided through the systematic process of developing diagnostic instruments that can be used to identify students' prior knowledge and potential misconceptions. The process began with analyzing the learning material to determine key concepts that need to be assessed. After identifying the essential concepts, teachers were encouraged to examine possible misconceptions or learning difficulties that students might experience when studying the material.

Following this stage, participants were introduced to the development of an instrument blueprint that outlines the structure and objectives of the diagnostic assessment. The blueprint serves as a guideline for writing assessment items that align with the targeted learning objectives. Teachers were then guided in writing the assessment items and conducting a trial test to evaluate the quality of the instrument. After the trial test, the results were analyzed to determine the validity and reliability of the items. The validated items were then assembled into a diagnostic test that can be

administered to students. Finally, teachers were instructed on how to analyze students' responses in order to identify patterns of misconceptions and learning difficulties. This process helps teachers gain a clearer understanding of students' initial knowledge and learning needs before implementing instructional strategies (Arikunto, 2018).

The speaker also highlighted the importance of diagnostic assessment as an essential component of the learning process. Diagnostic tests enable teachers to map students' prior knowledge and identify gaps in understanding that may hinder the learning process. By obtaining this information at the beginning of instruction, teachers can adjust their teaching strategies, select appropriate learning resources, and provide targeted support for students who require additional guidance. The use of diagnostic assessment is widely recognized as an effective approach to improving learning outcomes because it allows teachers to design instruction that is more responsive to students' needs (Black & Wiliam, 2018).

After the presentation sessions, the activity continued with an interactive question-and-answer session. During this session, the participating teachers showed great enthusiasm by asking various questions related to the implementation of deep learning and diagnostic assessment in their classrooms. Several teachers shared their personal experiences in conducting classroom assessments and discussed the challenges they encountered when identifying students' misconceptions. These discussions provided valuable opportunities for participants to exchange ideas and reflect on their teaching practices. Collaborative discussions among educators are important because they encourage professional reflection and support the development of innovative teaching strategies (Desimone & Garet, 2015).

The active participation of teachers throughout the discussion session indicated that the activity successfully created a collaborative learning environment. Teachers were able to connect the theoretical explanations provided by the speakers with their own classroom experiences. Through this interaction, participants gained new perspectives on how to improve the effectiveness of their teaching by integrating deep learning principles and diagnostic assessment strategies. This form of professional learning is essential for strengthening teachers' pedagogical competence and supporting continuous improvement in educational practice.

At the end of the activity, the moderator summarized the key points discussed during the session, emphasizing the importance of implementing deep learning approaches and diagnostic assessments to improve teaching quality. The moderator also highlighted that understanding students' prior knowledge and misconceptions is a crucial step in designing effective learning activities. The activity concluded with expressions of appreciation to the speakers and participants for their active involvement and contributions throughout the program.

Overall, the community service activity provided teachers with valuable knowledge and practical guidance on applying deep learning principles and diagnostic assessment in classroom instruction. The presentations and discussions helped teachers develop a better understanding of how to design meaningful learning experiences and how to identify students' learning needs more effectively. It is expected that the knowledge gained from this activity will support teachers in implementing more effective and student-centered learning practices in their classrooms, ultimately contributing to improved learning outcomes and the overall quality of education.

Conclusion

The community service activity conducted a*demonstrated that socialization and discussion-based professional development can effectively enhance teachers' understanding of deep learning strategies and diagnostic assessment practices in classroom instruction. Through presentations, interactive discussions, and question–answer sessions, teachers were able to explore the principles of deep learning and understand the importance of identifying students' prior knowledge through diagnostic instruments. The activity also provided teachers with practical insights into how diagnostic assessments can be systematically designed and implemented to identify misconceptions and learning difficulties, which are essential for improving instructional effectiveness.

The discussions and sharing of classroom experiences among participants created a collaborative learning environment that encouraged reflective teaching practices. Such professional learning opportunities are important because they help teachers develop pedagogical competence and adapt their instructional strategies to meet students' diverse learning needs. By integrating deep learning approaches with the use of diagnostic assessments, teachers are better equipped to design learning experiences that promote critical thinking, active engagement, and meaningful understanding of subject matter. This aligns with recent educational perspectives that emphasize the role of formative and diagnostic assessment in supporting student-centered learning and improving teaching quality (Bennett, 2021).

Furthermore, the activity highlighted the importance of continuous professional development for

teachers, particularly in adapting to evolving educational frameworks and curriculum demands. Training and socialization programs enable teachers to update their knowledge, exchange experiences, and apply innovative strategies in their teaching practices. Effective professional development not only strengthens teachers' instructional skills but also contributes to improved student learning outcomes and more responsive educational practices (Darling-Hammond et al., 2022).

Overall, the implementation of this community service activity successfully provided teachers with new knowledge and practical guidance on applying deep learning principles and diagnostic assessment in classroom instruction. The activity is expected to support teachers in designing more effective and contextual learning experiences that address students' learning needs and foster deeper conceptual understanding.

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References

Admiraal, W., Schenke, W., De Jong, L., Emmelot, Y., & Sligte, H. (2021). Schools as professional learning communities: What can schools do to support professional development of their teachers? *Professional Development in Education, 47*(4), 684–698. https://doi.org/10.1080/19415257.2019.1665573

Aikenhead, G. S., & Ogawa, M. (2007). Indigenous knowledge and science revisited. *Cultural studies of science education*, *2*(3), 539-620.

Arikunto, S. (2018). *Dasar-dasar evaluasi pendidikan* (3rd ed.). Bumi Aksara.

Bennett, P. (2021). Teaching itself: a mythology of learning in theory and practice.

Black, P., & Wiliam, D. (2021). Classroom assessment and pedagogy. *Assessment in Education: Principles, Policy & Practice, 28*(6), 716–737. https://doi.org/10.1080/0969594X.2021.1933823

Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2022). Effective teacher professional development: Research, policy, and practice. *Educational Researcher, 51*(8),518–530. https://doi.org/10.3102/0013189X221134298

Desimone, L. M., & Garet, M. S. (2015). Best practices in teachers' professional development. *Psychology, Society, & Education, 7*(3), 252–263. https://doi.org/10.25115/psye.v7i3.515

Desimone, L. M., & Garet, M. S. (2020). Best practices in teachers' professional development in the United States. *Psychology, Society, & Education, 12*(3), 1–16. https://doi.org/10.25115/psye.v12i3.3107

Fullan, M., Quinn, J., & McEachen, J. (2018). *Deep learning: Engage the world change the world*. Corwin Press.

Fullan, M., Quinn, J., Gardner, M., & Drummy, M. (2021). *Deep learning: Engage the world, change the world* (2nd ed.). Corwin Press.

Hattie, J. (2017). *Visible learning for teachers: Maximizing impact on learning*. Routledge.

Loughran, J. (2023). Developing reflective practice in teaching: A framework for teacher professional learning. *Teaching and Teacher Education, 125*, 104063. https://doi.org/10.1016/j.tate.2023.104063

Philpott, C., & Oates, C. (2022). Teacher professional learning and development: Practice, theory and policy. *Educational Review, 74*(4), 562–577. https://doi.org/10.1080/00131911.2020.1825337

Rahmawati, Y., Hadinugrahaningsih, T., & Ridwan, A. (2022). Integrating local wisdom into science learning to promote meaningful understanding. *International Journal of Science Education, 44*(10), 1612–1630. https://doi.org/10.1080/09500693.2022.2077021

Sudarmin, S., Zahro, L., Pujiastuti, S. E., & Asyhar, R. (2021). The development of ethnoscience approach in science learning to improve students' scientific literacy. *International Journal of Instruction, 14*(2), 545–560. https://doi.org/10.29333/iji.2021.14231a

Treagust, D. F., & Chandrasegaran, A. L. (2022). The role of diagnostic assessment in addressing students' misconceptions in science learning. *Journal of Research in Science Teaching, 59*(6), 1024–104 https://doi.org/10.1002/tea.21760