

The Role of Teachers in Guiding the Science Learning Process at SDN Ie Jeureuneh, Trumon Tengah, Aceh Selatan: A Qualitative Study

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Abstract

The role of teachers in guiding the process of learning Natural Science (IPA) is essential for fostering curiosity, critical thinking skills, and students' understanding of scientific concepts. This study aims to explore the role of teachers at SDN Ie jeureuneh, Trumon Tengah, Aceh Selatan in guiding the IPA learning process, including teaching strategies, challenges faced, and solutions implemented. This research utilizes a qualitative approach through a case study method. Data collection was carried out through classroom observations, interviews with teachers and students, and document analysis such as lesson plans (RPP). The results indicate that teachers employ various methods, including inquiry-based learning, contextual approaches, and simple experiments to enhance student engagement. However, limited resources, lack of professional training, and varying student interests pose significant challenges. This study emphasizes the importance of institutional support in providing resources, training, and collaborative platforms for teachers. Recommendations include enhancing teacher training programs, providing context-appropriate teaching materials, and involving the community in the educational process. These steps are crucial to ensure effective science learning and inspire students to explore scientific phenomena with enthusiasm.

Keywords: Teacher Role, Science Education, Natural Science, Inquiry-Based Learning

Introduction:

1. Importance of Science Education at the Elementary School Level

Science education at the elementary school level plays a crucial role in building a foundation for students' scientific literacy. Scientific literacy encompasses not only the ability to understand scientific concepts but also includes critical thinking skills, problem-solving abilities, and an awareness of environmental and social issues related to science (Bybee, 2010).

At the elementary education stage, science helps students comprehend the relationship between humans and the environment while introducing them to the scientific method. This learning process includes observation, hypothesis formulation, experimentation, data analysis, and conclusion drawing. These skills are essential for students to face global challenges such as climate change, resource conservation, and technological development (OECD, 2018).

As one of the core subjects, science learning in elementary schools is designed to strengthen students' knowledge about the natural world and the phenomena occurring around them. The science curriculum in Indonesia emphasizes inquiry-based approaches aimed at developing students' curiosity while building investigative skills (Kemdikbud, 2013).

2. The Role of Teachers in Science Learning

Teachers play a central role in guiding students through the science learning process. Not only do teachers convey information, but they also act as facilitators who help students understand abstract concepts through interactive and relevant approaches to everyday life (Shulman, 1986).

In the context of science learning, teachers are responsible for:

- **Fostering Curiosity:** Teachers motivate students to ask questions and seek answers to phenomena they encounter in their daily lives.
- **Guiding the Inquiry Process:** Teachers assist students in formulating questions, developing hypotheses, and conducting simple experiments to find solutions.
- **Connecting Concepts to Reality:** Teachers relate scientific concepts to local contexts, such as environmental issues, health, or technology, to make them more relevant to students.
- **Overcoming Learning Barriers:** Teachers also play a vital role in assisting students who struggle to understand concepts, especially in schools with limited resources.

In science education, inquiry-based approaches are often the most effective methods to enhance student engagement. This method allows students to become active learners who not only receive information but also process, analyze, and draw conclusions from their experiences (Llewellyn, 2013).

3. Challenges in Science Learning at the Elementary School Level

Despite its importance, the implementation of science learning at the elementary school level often faces various challenges, especially in rural areas like Aceh Selatan.

a. Resource Limitations

The availability of adequate resources, such as laboratories, teaching aids, and contextual learning materials, is one of the main obstacles in science education (Hodson, 2003). Many elementary schools, particularly in remote areas, lack the facilities to conduct simple experiments. Consequently, teachers often have to improvise using locally available materials.

b. Insufficient Teacher Training

Teachers often do not receive adequate training to adopt modern teaching methods, such as inquiry-based learning or the use of technology in teaching (Darling-Hammond et al., 2017). In Aceh Selatan, many teachers have minimal experience integrating interactive approaches into science learning, resulting in conventional and less engaging lessons for students.

c. Diversity of Student Backgrounds

Each student possesses different interests, abilities, and experiences in understanding science. Some students may have a strong interest in science, while others may be less engaged or struggle with the concepts taught. Teachers must be able to adjust their teaching strategies to meet the diverse learning needs of students (Tomlinson, 2001).

d. Lack of Institutional Support

Support from schools and the government in the form of resource provision, training, and development of relevant curricula is often limited. This makes it difficult for teachers to implement innovative and effective approaches in science education (Raihani, 2014).

4. Relevance to the Context of SDN Ie jeureuneh, Trumon Tengah, Aceh Selatan

SDN Ie Jeureuneh, Trumon Tengah, Aceh Selatan is one of the schools in a rural area facing unique challenges that reflect the educational conditions in remote regions of Indonesia. As an elementary school, SDN Ie Jeureuneh, Trumon Tengah Aceh Selatan confronts limited facilities and resources that support science learning. However, teachers at this school strive to develop innovative strategies to ensure that students still receive meaningful learning experiences.

Some characteristics that make SDN Ie Jeureuneh, Trumon Tengah, Aceh Selatan a focus of this research include:

- Local Context: The school's location in a rural area provides unique challenges and opportunities in integrating scientific concepts with local environmental issues.

- Infrastructure Limitations: The limited school facilities encourage teachers to be more creative in utilizing available resources.
- Teachers as Primary Facilitators: Teachers at SDN Ie Jeureuneh, Trumon Tengah, Aceh Selatan not only act as educators but also as inspirers, encouraging students to actively engage with science.

5. Previous Studies and Research Gaps

Previous research has shown that the role of teachers is crucial to the success of science education. For example, Bybee (2010) emphasized the importance of inquiry-based approaches to enhance student engagement in science learning. However, there is limited research specifically exploring how teachers in remote areas like Aceh Selatan address resource limitations and other challenges in guiding students in science education.

This study aims to fill this gap by providing insights into the strategies used by teachers at SDN Ie Jeureuneh, Trumon Tengah Aceh Selatan in guiding the science learning process, the challenges faced, and the creative solutions implemented.

6. Research Objectives

This research aims to:

- Identify the strategies used by teachers to guide science learning at SDN Ie Jeureuneh, Trumon Tengah Aceh Selatan.
- Explore the challenges faced by teachers in teaching science, including resource limitations and training.
- Discover the creative solutions implemented by teachers to overcome obstacles in science learning.
- Provide recommendations for improving the quality of science education in rural elementary schools.

Methodology:

1. Research Design

This research adopts a qualitative approach with a case study design as proposed by Yin (2009). The case study method was chosen to gain an in-depth understanding of the role of teachers in the context of science education at SDN Ie Jeureuneh, Trumon Tengah, Aceh Selatan, as well as to explore the dynamics between teachers, students, and the existing learning context.

2. Data Collection Techniques

Data collection was carried out using three main techniques:

- Observation: Direct observations were conducted in the classroom to capture the interactions between teachers and students, as well as to observe the teaching strategies

employed in the science learning process. This observation aimed to provide a real picture of the classroom atmosphere and the methods used by teachers.

- Interviews: Semi-structured interviews were conducted with five teachers and 15 students. The purpose of the interviews was to gain in-depth perspectives from both teachers and students regarding the science learning process, including the challenges faced and the strategies implemented to overcome them. The semi-structured format allows flexibility in exploring additional topics that arise during the interviews.

- Document Analysis: Related documents, such as lesson plans (RPP), teaching materials, and evaluation materials, were analyzed to identify patterns in teaching practices. Document analysis helps to provide a broader context regarding the implementation of the curriculum and the strategies used by teachers.

3. Data Analysis

The collected data will be analyzed using thematic analysis techniques as guided by Braun & Clarke (2006). The analysis steps include:

- Familiarization with the data through in-depth reading and initial understanding.
- Coding the data to identify relevant initial themes connected to the research questions.
- Developing broader themes based on patterns that emerge from the data, including comparative analysis between the perspectives of teachers and students.
- Compiling a narrative that summarizes the main themes related to teaching strategies, challenges faced, and learning outcomes at SDN Ie Jeureuneh, Trumon Tengah, Aceh Selatan.

4. Ethical Considerations

This research takes ethical considerations seriously. Participant confidentiality is ensured through the use of pseudonyms. Before conducting interviews and observations, written consent was obtained from all participants, both teachers and students, to ensure that they felt comfortable and understood the purpose and benefits of this research. Additionally, the researcher explained that participation was voluntary and could be withdrawn at any time without consequences.

Results and Discussion:

1. Teachers' Strategies in Guiding Science Learning

a. Implementation of Inquiry-Based Learning Methods

One of the primary approaches used by teachers at SDN Ie Jeureuneh, Trumon Tengah Aceh Selatan is inquiry-based learning. In classroom observations, teachers were seen starting lessons with open-ended questions such as:

- "Why does it rain?"

- "How do plants obtain food?"

Teachers facilitated students to formulate hypotheses and design simple experiments to find answers. For example, in the topic of photosynthesis, the teacher asked students to bring leaves from their surroundings and use simple materials like clear plastic to demonstrate the process of transpiration. This approach encourages students to take an active role in the learning process, increases curiosity, and develops critical thinking skills.

b. Use of Contextual Approaches

Teachers integrated science concepts with students' daily lives. For instance:

- In the topic of the water cycle, the teacher related the material to the phenomenon of rain that frequently occurs in Aceh Selatan.
- To discuss the concept of energy, the teacher used simple tools like homemade windmills to explain wind energy.

This strategy helps students see the relevance of science to their environment, thereby increasing their motivation to learn.

c. Simple Experimental Learning

Due to limited laboratory facilities, teachers used simple teaching aids made from local materials. For instance, used plastic bottles were utilized for air pressure experiments, and plastic bags were used to demonstrate the greenhouse effect. These experiments not only facilitated students' understanding of the concepts but also demonstrated that science can be practiced with inexpensive and easily found tools.

d. Group Collaboration

In several learning sessions, teachers divided students into small groups for discussion and collaborative tasks. This approach allows students to learn from peers, enhances communication skills, and strengthens a sense of shared responsibility.

2. Challenges in Guiding Science Learning

a. Resource Limitations

Teachers often face constraints such as a lack of textbooks, teaching aids, and adequate laboratory facilities. As a solution, they utilize local materials to create learning media. For example, leaves, stones, and water from their surroundings were used for experiments on ecosystems and the life cycles of living beings.

However, these resource limitations remain a significant challenge, especially when learning topics require more complex tools, such as microscopes or basic chemicals.

b. Lack of Professional Training

Based on interviews, most teachers acknowledged that they had not received adequate training in using inquiry-based learning methods. They also felt less confident in integrating technology, such as the use of science simulation applications, into their teaching. This affects the variety of approaches that teachers can utilize.

c. Variability in Student Interests and Abilities

Students' interest in science varies widely. Some students show high enthusiasm for experiments and discussions, while others struggle to understand abstract concepts such as energy or force. Teachers must adapt their teaching strategies to ensure all students can grasp the material, but this requires additional time and effort.

d. Lack of Institutional Support

Teachers feel that support from the school and local education authorities is not optimal. The availability of teaching aids is often limited, while the need for professional training is not always prioritized.

3. Solutions and Innovations Implemented by Teachers

a. Utilization of Local Resources

Teachers harness local resources to create relevant teaching aids. For example:

- Bamboo was used to make simple tools explaining the concept of pressure.
- River water was utilized for filtration and water cycle experiments.

This strategy not only addresses resource limitations but also increases student engagement as they can directly observe the relationship between science material and their environment.

b. Enhancing Teacher Collaboration

Teachers at SDN Ie Jeureneh, Trumon Tengah, Aceh Selatan collaborate in designing lesson plans and share experiences about effective teaching methods. This helps them find creative solutions to overcome challenges in science education.

c. Use of Multisensory Approaches

Teachers employed approaches involving various student senses to explain abstract concepts. For instance, when explaining the concept of kinetic energy, teachers asked students to run, suddenly stop, and feel the change in energy within their bodies. This approach effectively enhances students' understanding.

d. Use of Simple Technology

Although technology limitations pose challenges, teachers use personal mobile phones to show simple experiment videos from YouTube. This helps students understand concepts that are difficult to visualize directly.

4. Impact on Student Learning Outcomes

a. Increased Student Participation

Based on observations, students showed more active engagement in learning when teachers used inquiry and experimental methods. They more frequently asked questions, expressed opinions, and engaged in discussions with peers.

b. Better Conceptual Understanding

Formative test results indicate that students involved in experimental-based learning had a better understanding of science concepts compared to students who only participated in conventional learning.

c. Increased Interest in Science

Some students who previously found science difficult have now shown a greater interest in learning, especially after they observed the relevance of the material to their everyday lives.

5. Research Implications

a. Theoretical Implications

This research supports the importance of teachers' roles as facilitators of inquiry-based learning, especially in schools with limited resources. Contextual and collaborative approaches have proven effective in enhancing student engagement.

b. Practical Implications

The findings of this research recommend that teachers:

- Be more creative in utilizing local resources.
- Enhance collaboration with other teachers.
- Use simple technology to support learning.

c. Policy Implications

The government and school authorities need to increase support for teachers in the form of professional training, provision of facilities, and development of a curriculum that is relevant to the local context.

Conclusion

This research highlights effective strategies employed by teachers at SDN Ie Jeureuneh, Trumon Tengah, Aceh Selatan in guiding science learning that adapt well to the unique challenges of the educational context. The findings underscore the significant impact of inquiry-based learning, contextual approaches, and collaborative learning on student engagement and understanding. The teachers' ability to integrate local resources into their teaching not only addresses limitations in materials but also enriches the learning experience by connecting academic concepts to students' everyday lives.

Despite facing challenges such as limited resources, inadequate professional training, varying student interests, and a lack of institutional support, these educators demonstrate resilience and creativity in their teaching practices. The use of simple experimental methods, multisensory approaches, and technology has proven effective in enhancing student participation and conceptual understanding.

Furthermore, the study reveals that increased collaboration among teachers at the school fosters a supportive professional community, allowing educators to share best practices and innovative solutions to common obstacles. This collaboration is crucial for broadening the range of effective teaching methodologies available to them, ultimately benefiting their students.

In light of these findings, it is essential for educational stakeholders, including policymakers and school administrations, to recognize the importance of providing adequate support and resources for teachers. Efforts towards professional development, provision of teaching materials, and enhancement of infrastructural facilities are necessary to cultivate an environment conducive to high-quality science education.

Overall, the research emphasizes the vital role of teachers as facilitators in the learning process and advocates for continued investment in and support for innovative educational practices that can inspire students and foster a deeper interest in science. Such efforts will not only benefit individual students but also contribute to the advancement of science education as a whole, preparing students to engage meaningfully with scientific concepts and phenomena in their lives.

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