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Performance improvement of biology learning based on local natural resources conservation through environmental literacy culture in students (Case study: SMA Negeri 1 Baregbeg Ciamis and SMA Negeri 1 Karangnunggal Tasikmalaya)

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ABSTRACT

Background: This research explores the improvement of biology learning outcomes through the integration of local natural resources conservation and the promotion of environmental literacy among students at SMA Negeri 1 Baregbeg, Ciamis, and SMA Negeri 1 Karangnunggal, Tasikmalaya.
Aim: The study focuses on developing effective learning management strategies that encourage student engagement and enhance their environmental literacy.
Material and Methods: A qualitative case study approach was adopted, involving interviews, observations, and documentation to collect data on the implementation of biology learning based on local conservation efforts.
Results: The research examines how schools can collaborate with various stakeholders, including government agencies and community organizations, to integrate conservation knowledge into the curriculum. Findings highlight the importance of a collaborative approach to education that involves external environmental partners to enrich students' learning experiences. The study also identifies challenges in infrastructure, teaching methods, and the need for a more structured curriculum that incorporates environmental issues holistically. Through this research, it is emphasized that fostering environmental literacy in biology learning can help students develop critical thinking skills and a deeper understanding of local natural resource management.
Conclusion: The results suggest that project-based learning, field studies, and real-world applications are key components in cultivating a sense of responsibility for the environment. Recommendations for improving the curriculum include integrating conservation topics into biology education, enhancing teacher training, and fostering partnerships with local environmental stakeholders. This research contributes to the development of a sustainable and contextually relevant educational model that prepares students to address environmental challenges through informed decision-making and proactive engagement in conservation efforts.

Keywords: Environmental Literacy, Conservation-based Education, Biology Learning Management, Stakeholder Collaboration, Sustainable Development

1. Introduction

Learning activities should be conducted in a cohesive manner, creating a unified learning environment with all elements working together. The education of a generation is a joint effort involving the government, parents, society, entrepreneurs, and the private sector. It is essential for each component to play a role in the learning process by contributing their unique skills and values to enhance students' understanding and knowledge, encouraging critical thinking from different perspectives and broadening their horizons.

The coordination of learning is essential for organizing and guiding learning activities to ensure they are effective, structured, and targeted. Learning coordination involves developing a suitable curriculum, choosing appropriate methods, and providing necessary learning materials to create a conducive learning atmosphere that helps students achieve their learning goals. An inclusive learning environment fosters student engagement, motivation, and interactive participation in challenging and stimulating learning tasks, both inside and outside the classroom, connecting students to diverse aspects of their surroundings. The learning process involves not just students, but also the entire school community and the surrounding environment, which serve as sources of support for learning. This concept will be explored through research on promoting environmental awareness in students by involving various stakeholders.

The importance of environmental literacy is subtly discussed in the Republic of Indonesia's Law Number 20 of 2003 on the National Education System, specifically in Chapter X Curriculum Article 36 Paragraph 3 Point d. This section emphasizes that the curriculum should be tailored to different education levels within the framework of the Republic of Indonesia, taking into consideration the varying regions and environmental resources. This implies that curriculum planning in education needs to be comprehensive and encompassing of various environmental aspects. It is essential for schools to engage with different elements in their surroundings, not solely for school accountability, but more importantly to enhance the quality of education. Schools should be able to create a well-structured curriculum that not only focuses on academic achievements and learning goals, but also promotes environmental literacy and other types of knowledge development.

Government Regulation of the Republic of Indonesia Number 22 of 2021, which addresses Environmental Protection and Management, specifies in Chapter I General Provisions Article 1 point b that environmental protection and management involve a comprehensive approach aimed at maintaining the integrity of the environment and avoiding pollution or harm through activities such as planning, utilization, monitoring, conservation, observation, and enforcement of laws (Utari et al., 2021). The issue at hand suggests that environmental management should be approached with organized systems that are informed by an understanding of natural resources. High school students are exposed to various subjects, including biology, which aims to educate them about natural resources in a structured way, going beyond mere memorization of facts and concepts (Alimah, 2019). The goal of this topic is to educate students on the intricacies of the existence, durability, and revival of natural resources as a system that nurtures life. Environmental education, when approached from a Biological perspective, complements governmental endeavors towards realizing Sustainable Development Goals (Jannah, 2020). One of the key focuses of the Sustainable Development Goals (SDGs) is the 13th goal, which involves addressing climate change and its impacts. Prioritizing education on sustainable resource management and environmental preservation is essential for equipping the next generation with the skills needed to navigate the challenges posed by climate change in the years to come (Nurcahyani et al., 2022).

The data indicates that Biology education has primarily been focused on classroom-based research and teacher-led instruction. There has been limited exploration of the subject in outdoor settings, with a narrow focus on studying specific topics rather than taking a broader, more comprehensive approach. Syukri (2013) firmly suggests that Biology should now encompass environmental education in addition to environmental knowledge. It is

crucial to instill environmental literacy in students in order to cultivate their ability to think critically from multiple perspectives and analyze field data effectively. Students need to be educated on how to be environmentally conscious, compassionate, critical thinkers, and innovative problem solvers when addressing matters concerning the preservation and sustainability of local natural resources. Furthermore, once students reach the age of 15 and beyond, their cognitive abilities have matured to the point where they can engage in formal operational thinking and apply logic to their reasoning (Kahar & Fadhilah, 2019).

Addressing a related subject in a study conducted by Handayani & Sulastini (2023) to a group of students from the agriculture department recently carried out a field study on the ecosystem at Gunung Puntang. During this study, they learned valuable lessons and gained insights by involving forestry stakeholders and informants. This allowed the students to think globally and analyze the situation from different angles, beyond just focusing on the growth of forest plants. Engaging in environmental literacy through field studies expanded the students' horizons and enabled them to offer informed opinions and innovative ideas on natural resource conservation in the area, with the participation of multiple stakeholders.

Understanding the environment, including its challenges and solutions, is known as environmental literacy (Ahmadi, 2022). Environmental literacy in Indonesian society is still seen as lacking. This observation comes from the findings of a survey conducted by the Ministry of Environment in 2012 across 12 provinces in Indonesia. The national index average was 0.57, suggesting that people's environmental consciousness in their daily lives is lacking (Wiryono, 2013). Thus, it is imperative to enhance students' understanding of the environment by incorporating environmental literacy into their education. Nasution (2016) mentioned that students with a strong understanding of the environment will be more likely to make informed and responsible decisions when it comes to environmental issues. This suggests that environmental literacy should not solely be limited to schools but should instead involve a wide range of sources to enhance and deepen students' knowledge.

Students need a thorough and cooperative approach to develop knowledge about environmental issues. Schools play a crucial part in educating students on the environment and helping them acquire essential skills and information (Nasution, 2016). Nonetheless, the effectiveness of this position depends on the collaboration of different sectors of society, such as the family, community, and government. Additionally, technology and mass media have the potential to enhance public awareness of environmental issues. Online platforms offer a vast array of up-to-date information on the environment. Social media campaigns that focus on educating individuals about the significance of protecting the environment can engage a larger and more diverse group of people. The quick spread of information on beneficial environmental practices among different segments of society is made possible through the use of technology. The main obstacle lies in ensuring that awareness of environmental issues leads to tangible actions, rather than just knowledge. To achieve this, an interactive learning strategy based on projects is essential, involving students directly in conservation efforts. For example, students can conduct research projects to pinpoint environmental problems in their surroundings and devise innovative, practical solutions.

In connection with the aforementioned explanation, there were multiple underlying issues observed within the field, specifically:

1) Failure to collaborate with external organizations in the environmental sector can hinder the enhancement of educational quality, particularly in Biology programs focused on conservation, where the environment serves as a valuable learning resource.
2) Encouraging creativity in students through innovative learning approaches is essential for fostering their ability to generate conservation-related ideas that are grounded in both conceptual understanding and theoretical knowledge acquired in the classroom.
3) There is a requirement to have facilities and infrastructure that specifically focus on conservation content, allowing students to observe, recognize, and analyze the resilience and vulnerability of natural resources in a hands-on setting.

The intentions behind this study are the following:

1) Provide descriptions, evaluations, examinations, and creation of items regarding the progression of Biology education administration in enhancing awareness of the environment at SMA Negeri I Baregbeg Ciamis and SMA Negeri I Karangnunggal Tasikmalaya.
2) Uncover the extent to which students and staff at SMA Negeri I Baregbeg Ciamis and SMA Negeri I Karangnunggal Tasikmalaya are engaged and educated in promoting environmental awareness.
3) Learn how incorporating local natural resource management into Biology education can meet educational needs and serve as a benchmark for achieving goals and improving student learning outcomes in a structured and quantifiable way, both in theory and practice.

2. Methodology

The study follows a qualitative approach using a case study method to explore the correlation between academic performance and the surrounding environment. The researcher actively participated in all stages of the research process, including planning, data collection, analysis, and reporting on the efficacy of Biology education in promoting environmental awareness. The study was conducted at SMA Negeri I Baregbeg Ciamis and SMA Negeri I Karangnunggal Tasikmalaya, chosen for their established presence and academic success in their respective regions. Various data collection methods were employed to ensure reliable and comprehensive results aligned with the research focus.

1) Interview with informants; the process of gathering information involved interviewing sources, both formally and casually, using predetermined interview guidelines. The questions asked were designed to be open-ended, giving participants the opportunity to freely share their thoughts without any constraints.
    a. The principal is responsible for overseeing the school policies and ensuring the needs of all stakeholders are met, particularly those focused on enhancing the quality of Biology education,
    b. The Vice Principal is involved in developing a curriculum that focuses on academic rigor and engagement, particularly in the area of environmental literacy for both students and staff at the school,
    c. Biology teachers focus on the specifics of their teaching methods, the activities involved in the learning process, and the primary agenda for every session, particularly within the realm of conservation jargon related to local environmental assets.
    d. Student representatives are tasked with gathering and delving into information about how well students grasp the concepts of local natural resource conservation, as well as their educational requirements for both theoretical and practical learning experiences.
2) Observation; an assessment was carried out to examine the specific conditions and interactions occurring during the educational process involving Biology students and their teacher. The observation was conducted to complement the data gathered from interviews. The direct observation was focused on the key areas of interest in the research.
    a. Assessing student engagement in Biology lessons, both in and out of the classroom, with a specific focus on their level of interest when learning about local natural resource conservation.
    b. The daily routines of students at school are influenced by the level of environmental literacy culture present in the school.
3) Documentation; The research involved analyzing relevant materials to gather information on Biology education related to natural resource conservation. The focus was on understanding learning activities that aim to enhance environmental literacy through interviews and observations in the planning, execution, and

evaluation stages.

Inductive methods of data analysis were utilized to extract crucial themes from interviews, observations, and documentation. Initially, all data from different sources like field notes, personal/official documents, and photos were thoroughly examined to align with the research goals. Following the data review, abstractions were made to condense the information, which was then categorized into content groups. Ensuring the accuracy of the data, the focus shifted to interpreting the data and outlining the discoveries related to the research problem and objectives.

3. Results and Discussion

The concept of enhancing students' environmental literacy culture through biology education that focuses on local natural resource conservation is both analytical and practical. It involves analyzing the science behind natural resources learned in class and implementing this knowledge in a contextual manner. This approach requires students to not only acquire environmental information, but also to effectively respond to environmental challenges and view conservation as a viable solution.

The research conducted at SMA Negeri 1 Baregbeg Ciamis and SMA Negeri I Karangnunggal Tasikmalaya revealed the following findings in relation to the background and issues mentioned earlier:

1. Building cooperation partners

According to the author's research, it has been revealed that the two locations have been actively collaborating with various stakeholders. This collaboration is focused on enhancing the quality and reputation of the schools in order to raise the standards of national education achievement. The partnerships are developed based on the school's strategic and operational plans, taking into account the resources and potential of the surrounding area. Among the organizations currently involved in collaborations with schools are the Nature Reserve Conservation Center, Animal Insemination Center, Agriculture Center, Natural Resources Conservation Center, and Clean Water Source Managers. The collaborations involve the implementation of innovative programs by the schools, including activities such as tree planting, botanical naming, local plant and animal identification, simple water filtration projects, and hydroponics, both for short-term and long-term initiatives.

With the rise in educational needs, schools should enhance and refine their collaboration strategically in order to secure the school's future. This can be achieved by taking the following factors into account:

a. Stakeholder involvement needs to be consistently reassessed and improved to meet the current requirements that are mutually beneficial for both the school and the stakeholders. While stakeholders play a crucial role in enhancing school accountability, the focus should be on the quality of students and teachers as educators. This quality serves as a benchmark for future collaborative initiatives aimed at implementing a literacy-focused curriculum.
b. By incorporating stakeholders into the curriculum development process, the principal and teachers must enhance their literacy skills before the students to ensure that stakeholder engagement can enhance the learning experience. The main goal is to enhance the level of literacy among students and teachers, which will enable greater collaboration on local conservation expertise and environmental data, ultimately enriching the students' knowledge and understanding.

2. Student learning performance and creativity

The study of Biology subjects focusing on the preservation of local natural resources is diverse and involves various fields in examining the evolution of living organisms. Observations at the site suggest that students have been taught and grasp the significance of conserving natural resources. This was evident during interviews with a selection of student representatives. Essentially, students show great interest in Biology subjects due to their progressive nature and lack of dullness. This is demonstrated by their ability to categorize the

productivity of natural resources and elaborate on various conservation methods based on different circumstances and requirements for managing these resources. Furthermore, the school has incorporated Biology lessons beyond the classroom setting. This skill set forms the foundation for students to enhance their capabilities and keenness in evaluating the development of natural resources.

When it comes to understanding the environment, students have the opportunity to showcase creativity beyond just practical applications. The conservation concepts cover a wide range of topics, including the socio-cultural aspects of local communities, making it even more intricate on a regional level. In contrast, creativity among high school students can be nurtured systematically through the following approach:

a. Encourage different thoughts and concepts by instilling in students the importance of being mindful, caring, and accountable for the environment, while also learning about the science behind natural resources.
b. Familiarize with various conservation methods; Students gain insight into the causes and consequences of natural resource dynamics by observing field conditions firsthand. This exposure also helps students grasp a range of suitable conservation principles and measures. They become adept at articulating essential ideas in basic terms or strategies. Following thorough analysis, students can proceed with practical steps towards conservation with the necessary resources and support.

3. Availability of infrastructure

When it comes to environmental education, the quality of learning resources can differ depending on the specific subject chosen by the instructor. Collaborating with partners, teachers have the opportunity to create a curriculum that allows students to grasp the fundamentals of natural resource preservation in response to environmental challenges. The essential components of learning resources and infrastructure for environmental literacy should encompass:

a. Library; it is crucial for students to utilize the school library to access literature and resources such as guidebooks, dictionaries, and e-books. By utilizing the library, students can not only learn from books but also verify information from reliable sources like government websites and agricultural research sites. The library serves as a gateway for students to explore a world of knowledge beyond traditional textbooks.
b. Environmental Open Space; the designated open area for learning consists of productive spaces utilizing local natural resources like agriculture and livestock. This practical approach allows students to understand biology concepts and explore the potential and impact of their surroundings.

4. Conclusion

The study found that creating a culture of environmental awareness in biology classes relies on utilizing resources from the local environment. Schools must enhance their grasp of biology concepts. Field research indicates that students demonstrate proficiency in examining natural resources for preservation in biology. Environmental literacy helps students develop critical thinking abilities concerning the conservation of natural resources and ecological gems. Engaging with stakeholders can improve school performance and educational quality. It is crucial to incorporate environmental values into the biology curriculum. Involving stakeholders in activities related to local natural resources demonstrates a commitment to environmental stewardship for future generations. Environmental education will advance through partnerships and cooperation with outside parties.

The suggestions for managing Biology education with a focus on preserving local natural resources include four main areas: planning, organization, implementation, and assessment. During the planning stage, the curriculum needs to be revamped to target biology concepts through outcome-based learning, incorporating creative teaching methods such as Inquiry-Based Learning, Problem-Based Learning, and Contextual Learning. Schools should

also establish partnerships with conservation stakeholders to enhance the curriculum performance at an organizational level. The main emphasis during implementation is on establishing hands-on learning experiences that incorporate real-life experiences, hands-on experiments, and encouraging students to think creatively about the environment. It is essential that the assessment process is thorough, involving evaluations based on projects, technology-driven monitoring, ongoing self-assessment, and interaction with members of the community. The end objective is to enhance students' understanding, abilities, and dedication to protecting the environment through a comprehensive, dynamic, and interactive educational method that extends beyond conventional classroom instruction.

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