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Implementing Deep Learning-Based Character Education to Foster Students' Environmental Awareness: A Policy Implementation Study in Indonesia

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Abstract

This study aims to analyze the implementation of deep learning-based character education in Social Studies (IPS) learning to foster students' environmental awareness and identify supporting and inhibiting factors. The study used a descriptive qualitative approach with the Edward III policy implementation framework, which includes communication, resources, disposition, and bureaucratic structure. The study was conducted at SMP Negeri 1 Muara Jawaq, West Kutai Regency. Informants were selected purposively, including the principal, IPS teachers, and students. Data were collected through semi-structured interviews, observation, and documentation, then analyzed through data condensation, data presentation, and drawing and verifying conclusions. The results showed that the implementation of deep learning-based character education was generally supported by ongoing communication at the organizational and learning levels, resource availability, implementer commitment, and coordination between school actors. Supporting factors included principal leadership, teacher competence and commitment, a conducive school culture, regulatory support, and stakeholder participation. Meanwhile, implementation still faces obstacles such as uneven teacher understanding of deep learning, suboptimal use of learning media, and limited family involvement. This implementation contributes to students' environmental awareness, as reflected in their knowledge, attitudes, and behavior. This research emphasizes the importance of integrating pedagogical approaches and policy implementation in strengthening environmental character education through social studies learning.

Keywords: Character Education; Deep Learning; Policy Implementation; Environmental Awareness; Social Studies Learning

1. Introduction

21st-century education is not only aimed at mastering academic knowledge, but also at developing students' character and ability to respond to social and environmental issues. Environmental education plays a crucial role because the learning process can

shape pro-environmental knowledge, attitudes, and behavior. A meta-analysis by Van De Wetering et al. (2022) shows that environmental education has a positive impact on various environmental outcomes in children and adolescents. Lee (2023) also emphasized the importance of integrating environmental

issues into learning to increase student awareness, while Araneo (2024) positioned education as a crucial instrument in supporting sustainable development. Therefore, environmental awareness needs to be developed as an integral part of the educational process and in shaping students' character.

In the Indonesian context, character education is an essential component of educational policy, integrating moral values into school learning and culture (Alawiyah, 2012). Character education encompasses not only understanding values but also shaping attitudes and actions in everyday life (Lickona, 1991). Empirical evidence suggests that character education programs positively impact student development (Brown et al., 2023), while a supportive school environment can foster sustainable character development (Thomas et al., 2023). In Social Studies (IPS) learning, character education is relevant because it enables students to understand the relationships between humans, society, and the environment, while simultaneously fostering social and environmental responsibility (Lobja et al., 2023).

One approach that can support this process is deep learning in the pedagogical sense, or a deep approach to learning, not deep learning in the context of artificial intelligence. This approach encourages students to move beyond memorization to a deeper, more reflective, and contextual understanding. Bächtold et al. (2025) define a deep approach to learning as a process related to the development of curiosity, independence, and reflection in learning. Meanwhile, Lu et al. (2023) link a deep learning approach to the development of higher-order thinking skills, and Zhang et al. (2025) demonstrate its relationship to learning outcomes. In the context of character education, this approach allows environmental issues to be used as contextual issues that encourage students to explore, analyze, reflect, and connect knowledge with concrete actions.

However, the implementation of deep learning-based character education is not only a pedagogical issue, but also a policy implementation process at the school level. Its success is influenced by the school's ability to translate policy into practice through communication, resource availability, implementer commitment, and institutional support. Edward III (1980) describes four main dimensions that determine policy implementation: communication, resources, disposition, and bureaucratic structure. This framework is relevant in this study because the implementation of deep learning-based character education involves the principal, teachers, students, and other stakeholders. In the research context, implementation is also influenced by teacher competence, school culture, the availability of learning facilities and media, parental involvement, and student participation.

While previous research has provided important foundations, studies on environmental education, character education, and deep approaches to learning are still developing along different paths. Environmental education is primarily studied in relation to pro-environmental attitudes and behaviors (Mónus, 2022; Van De Wetering et al., 2022), while character education focuses more on the effectiveness of programs and the school environment (Brown et al., 2023; Thomas et al., 2023; Oldham & McLoughlin, 2026). Studies on deep approaches to learning focus more on learning processes, higher-order thinking skills, and learning outcomes (Lu et al., 2023; Bächtold et al., 2025; Zhang et al., 2025). However, studies integrating deep learning-based character education, environmental awareness, and policy implementation at the school level have received relatively little attention. This gap is significant

because the success of learning approaches is determined not only by pedagogical design but also by how policies are translated and implemented in school practice.

Based on this gap, the novelty of this study lies in the use of a policy implementation perspective to explain how deep learning-based character education is translated into social studies learning practices in fostering students' environmental awareness. Unlike studies that primarily focus on the effectiveness of character education or learning outcomes, this study analyzes the implementation process through Edward III's (1980) four dimensions: communication, resources, disposition, and bureaucratic structure. Thus, this study aims to analyze the implementation of deep learning-based character education in social studies learning to foster students' environmental awareness and identify supporting and inhibiting factors for its implementation. This focus aligns with the research objectives at SMP Negeri 1 Muara Jawaq.

2. Literature Review

2.1 Deep Learning-Based Character Education

Character education is a systematic process for developing values that are not only understood cognitively but also internalized in attitudes and manifested through actions. Lickona (1991) explains character formation through three interrelated components: moral knowing, moral feeling, and moral action. In the Indonesian context, character education is an integral part of the educational process through the integration of values into learning and school life (Alawiyah, 2012). Research shows that character education programs have a positive impact on student development (Brown et al., 2023), while a conducive school environment also supports sustainable character formation (Thomas et al., 2023). In social studies learning, the integration of character values is relevant because learning not only conveys social knowledge but also builds students' responsibility towards society and their environment (Lobja et al., 2023).

Strengthening character education can be done through deep learning in a pedagogical sense or a deep approach to learning, which emphasizes in-depth understanding, reflection, connecting knowledge, and applying learning in real-world contexts. Bächtold et al. (2025) demonstrate the importance of a deep learning approach in fostering a more meaningful learning process, while Lu et al. (2023) link it to the development of higher-order thinking skills. Zhang et al. (2025) also demonstrate the relationship between the deep learning approach profile and learning outcomes. In character education, these characteristics enable students not only to learn values but also to understand their meaning, reflect on the consequences of actions, and apply them in their lives. Thus, deep learning-based character education can be understood as a learning process that integrates in-depth understanding and reflection with the internalization of values until they are realized in behavior.

2.2 Environmental Awareness through Education

Environmental awareness is a form of character reflected in an individual's knowledge, attitudes, and behavior toward environmental protection and sustainability. Education plays a strategic role in its formation because learning can connect understanding of environmental issues with concrete attitudes and actions. A meta-analysis by Van De Wetering et al. (2022) showed that environmental education has a positive impact on

environmental knowledge, attitudes, intentions, and behavior in children and adolescents. Mónus (2022) also showed that environmental education policies in schools are related to students' environmental attitudes and pro-environmental behavior. Thus, environmental awareness is formed not only through the delivery of information but also through learning experiences that enable students to understand the relationship between human actions and their consequences for the environment.

Learning that integrates environmental issues can strengthen this process. Lee (2023) emphasized the importance of building awareness of environmental issues through learning activities, while Araneo (2024) demonstrated the relevance of education for sustainable development in developing students' understanding and engagement with sustainability issues. Instilling environmental values is also necessary so that understanding can develop into consistent behavior (Yulianingsih et al., 2023). In the context of this research, deep learning-based social studies learning provides space for students to connect social and environmental issues with real-life experiences, reflect on them, and develop alternative solutions. Therefore, environmental awareness is understood as the outcome of the educational process, reflected in students' knowledge, attitudes, and behavior toward the environment.

2.3 Policy Implementation Framework

The implementation of deep learning-based character education is not only a pedagogical process but also a process of translating educational policy into practice at the school level. This study uses Edward III's (1980) policy implementation theory as the primary analytical framework. According to Edward III (1980), successful implementation is influenced by four dimensions: communication, resources, disposition, and bureaucratic structure. Communication relates to the delivery and understanding of policy objectives; resources encompass the capacity of human resources and supporting resources; disposition relates to the implementer's

attitude and commitment; and bureaucratic structure encompasses the division of responsibilities, procedures, and coordination in policy implementation. These four dimensions explicitly serve as the analytical framework for this study. The relevance of Edward III's model in analyzing policy implementation continues to be used in contemporary public policy studies (Tawai & Johanis, 2025; Habsana et al., 2026).

In the context of deep learning-based character education, these four dimensions are interrelated in determining how policies are translated into learning practices. Communication is necessary to build a consistent understanding of policy objectives; resources determine teacher readiness and learning facilities; disposition reflects the commitment of implementers; while bureaucratic structures support the division of roles and institutional coordination. In this study, implementation is also related to teacher competence, school culture, learning facilities and media, parental involvement, and student participation. Thus, the Edward III framework is used to explain how deep learning-based character education is implemented at the school level and the conditions that support and hinder its implementation in fostering students' environmental awareness.

Based on the literature synthesis, this study positions deep learning-based character education in social studies as an educational practice implemented within a policy context and analyzed through Edward III's (1980) implementation framework. Four dimensions of implementation—communication, resources, disposition, and bureaucratic structure—are used to understand how policy is translated into school practice and to identify conditions that support and hinder its implementation. This implementation is then examined in relation to the formation of students' environmental awareness, as reflected in aspects of knowledge, attitudes, and behavior. The research conceptual framework is presented in Figure 1.

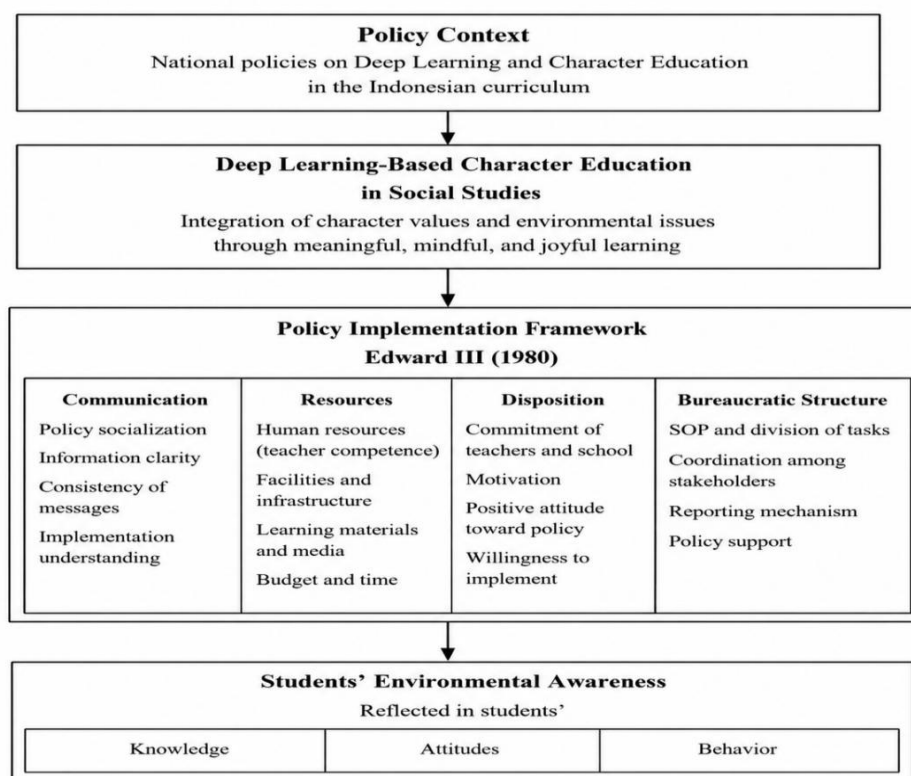


Figure 1. Conceptual Framework of the Study

Source: Developed by the authors.

3. Methods

3.1 Research Design and Location

This study uses a descriptive qualitative approach to analyze the implementation of deep learning-based character education in social studies and its contribution to students' environmental awareness. The study was conducted at SMP Negeri 1 Muara Jawaq, West Kutai Regency. The policy implementation analysis refers to Edward III's (1980) framework, which encompasses four dimensions: communication, resources, disposition, and bureaucratic structure. These four dimensions are used to understand the implementation process and identify factors that support and hinder its implementation.

3.2 Informants and Data Sources

Informants were purposively selected based on their involvement and knowledge regarding the implementation of deep learning-based character education. The informants interviewed consisted of the principal, social studies teachers, and students of SMP Negeri 1 Muara Jawaq. These three groups represent the perspectives of policy managers at the school level, learning implementers, and students as implementation subjects. Primary data were obtained through interviews, observations, and field notes, while secondary data came from school documents, learning tools, regulations, archives, activity documentation, and other supporting documents. To maintain the confidentiality of informants' identities, interview excerpts were anonymized using the code KS for the principal, G-IPS for the social studies teachers, and PD for the students.

3.3 Data collection technique

Data were collected through semi-structured interviews, observations, and documentation. Interviews were conducted with the principal, social studies teachers, and students to gather information on policy implementation and the formation of environmental awareness. Observations were conducted on the implementation of deep learning-based social studies instruction and character education activities at the school. Documentation was used to complement and confirm the interview and observation results through learning tools, teaching modules, school programs, activity photos, character education reports, and relevant policy documents. The researcher acted as the primary instrument (human instrument), with interview guidelines, observation guidelines, documentation sheets, and field notes as supporting instruments.

3.4 Data Analysis and Validity

Data were analyzed using the interactive model of Miles, Huberman, and Saldaña (2014) through three stages: data condensation, data presentation, and drawing and verifying conclusions. Data from interviews, observations, and documentation were coded and grouped according to the research focus, referring to the four dimensions of Edward III: communication, resources, disposition, and bureaucratic structure. The analysis also included supporting and inhibiting factors for implementation and students' environmental awareness. The analysis process was conducted interactively until data saturation was achieved.

Data validity was maintained through source triangulation, technical triangulation, time triangulation, member checking, and increased observational diligence (Sugiyono, 2023). Triangulation was conducted by comparing information between informants and

between interview results, observations, and documentation. Member checking was conducted to ensure interpretations matched the information provided by informants.

4. Results

The results of the study indicate that the implementation of deep learning-based character education in social studies at SMP Negeri 1 Muara Jawaq has generally been successful. Implementation takes place through classroom learning and school-based practices, and demonstrates a contribution to students' environmental awareness. The research findings are presented in three main sections: implementation based on the dimensions of communication, resources, disposition, and bureaucratic structure; supporting and inhibiting factors; and students' environmental awareness.

4.1 Implementation of Deep Learning-Based Character Education

4.1.1 Communication

The research findings indicate that policy communication occurs through school coordination, learning tools, and interactions between teachers and students during the learning process. Character education policies are not only communicated formally but also translated into daily learning and habits. The results indicate that communication occurs continuously through teacher-student interactions, while at the organizational level, policies are communicated through coordination meetings and learning tools.

Communication in learning is interactive. Students are given the opportunity to ask questions and receive clarification if they don't understand the material. One student stated:

"There was a time when there was a lesson that we still couldn't understand and we asked the teacher for an explanation." (PD, Interview)

These findings demonstrate that implementation communication occurs at both the school organizational level and the learning process. Two-way interaction between teachers and students helps students understand the material and the character values integrated into social studies learning.

4.1.2 Resources

From a resource perspective, teachers have attempted to implement active and contextual learning through discussions, questions and answers, problem-solving, reflection, and linking social studies material to the surrounding environment. One social studies teacher explained:

"Learning is done through discussions, questions and answers, and connecting the material with the surrounding environmental conditions so that students understand better and are able to apply it in everyday life."(G-IPS, Interview)

The principal's support is also a crucial part of the implementation resources. This support is realized through school programs, fostering a culture of environmental stewardship, and providing teachers with space to develop their learning. The principal stated:

"Forming environmental change agents in students and teachers, strengthening a culture of environmental care, and establishing collaboration with various parties in supporting character education."(KS, Interview)

In terms of facilities, the school has conducive classrooms, a clean school environment, trash receptacles in several locations, and a schoolyard that can be used as a resource for contextual learning. However, the use of technology-based learning media and collaborative projects still needs to be improved. Furthermore, teacher understanding of deep learning implementation is not yet fully ubiquitous, so competency development through training is still needed.

4.1.3 Disposition

The research results show a positive commitment from the principal, teachers, and students to the implementation of deep learning-based character education. The principal's commitment is reflected in efforts to build an environmentally conscious school culture, while teachers integrate character values into learning activities. At the student level, acceptance of the learning process is evident in their ease of understanding the material. One student stated:

"It could be because it's easier to understand the material given by the subject teacher."(PD, Interview)

Internalization of character values is also evident in students' understanding of environmental responsibility. Another student stated:

"We must have a sense of responsibility, a sense of caring for the surrounding environment and cooperation."(PD, Interview)

The findings indicate that the implementation received a positive response from the school community. Commitment was demonstrated not only through acceptance of the policy but also through involvement in learning and environmental awareness activities.

4.1.4 Bureaucratic Structure

In terms of bureaucratic structure, implementation is supported by the division of roles and coordination between the principal, subject teachers, homeroom teachers, guidance counselors, and the school community. The principal carries out the coordination function, while teachers translate the character education program into learning and habituation activities. Research results indicate that the division of tasks and coordination within the school organization have supported policy implementation.

This coordination is evident in learning practices and daily activities. One student explained:

"The teacher invited everyone to work together to clean the classroom and throw away trash in its place."(PD, Interview)

The integration between school policy and learning is also evident when social studies material is linked to environmental issues. Students convey:

"Yes, I have, during a lesson about the benefits of waste and how to process it to prevent pollution."(PD, Interview)

Thus, the implementation structure has enabled character education to be translated from the school policy level into learning activities and habits experienced directly by students.

Overall, the research results indicate that the implementation of deep learning-based character education is supported by the interconnectedness of communication, resources, disposition, and bureaucratic structure. These four dimensions have generally supported policy implementation, although several aspects still need improvement, particularly teachers' understanding of deep learning and the optimization of learning media. A summary of key findings based on the four dimensions of policy implementation is presented in Table 1.

Table 1. Summary of Policy Implementation Findings

Edward III Dimension	Main Findings	Empirical Evidence
Communication	Policy communication was implemented through school coordination, learning materials, and continuous teacher–student interaction.	Coordination meetings, learning materials, classroom interaction, and environmental-care habituation.
Resources	Human resources and basic school facilities generally supported implementation, although teachers' understanding of deep learning and the use of technology-based learning media still required improvement.	Active and contextual learning; adequate basic facilities; limited optimization of technology-based media and collaborative projects.
Disposition	The principal, teachers, and students demonstrated positive attitudes and commitment toward character education and environmental care.	Leadership commitment, teacher involvement, student participation, and environmental-care practices.
Bureaucratic Structure	Implementation was supported by role distribution and coordination among school actors.	Coordination among the principal, subject teachers, homeroom teachers, counseling teachers, and other school members.

Source: Research findings based on interviews, observations, and documentation.

4.2 Supporting and Inhibiting Factors

The research identified several factors supporting the implementation of deep learning-based character education. Internal factors include principal leadership, teacher competence and commitment, a conducive school culture, the availability of

basic facilities, and active student participation. Meanwhile, external factors include regulatory support, community involvement, partnerships with various parties, and parental involvement.

The principal's leadership is a key supporting factor. The principal demonstrates a commitment to building a culture of environmental stewardship through habituation and partnerships:

"Forming environmental change agents in students and teachers, strengthening the foundation of environmental care and establishing partnerships with other communities."(KS, Interview)

The school culture also supports the internalization of character values through community service, maintaining classroom cleanliness, planting trees, and promoting the habit of disposing of trash properly. Observations show that these practices ensure character education extends beyond classroom learning and is practiced in everyday school life.

On the other hand, several inhibiting factors exist. Teachers' understanding of the concept of deep learning varies, requiring training and mentoring. Students' environmental awareness is also not uniform, while the use of technology-based media, collaborative projects, and contextual learning resources still needs to be improved. Furthermore, family involvement in strengthening character education outside of school is not yet optimal, so the continuity of character development between the school and family environments still needs to be strengthened.

4.3 Students' Environmental Awareness

Research findings indicate that the implementation of deep learning-based character education contributes to students' environmental awareness, as reflected in their knowledge, attitudes, and behavior. These three aspects demonstrate that learning not only provides an understanding of environmental issues but also encourages the internalization of values and concrete actions.

In terms of knowledge, students are able to connect social studies learning materials to environmental issues. This is evident in their understanding of waste, its management, and environmental pollution:

"Yes, I have, during a lesson about the benefits of waste and how to process it to prevent pollution."(PD, Interview)

In terms of attitude, students demonstrate awareness of the importance of responsibility, concern and cooperation in protecting the environment:

"We must have a sense of responsibility, a sense of caring for the surrounding environment and cooperation."(PD, Interview)

In terms of behavior, environmental awareness has been translated into everyday actions. One student explained:

"If we see rubbish scattered around or in the school environment, we should pick it up and throw it away in the proper place."(PD, Interview)

These changes are also supported by a school culture of community service activities, classroom cleanliness, greening, and the practice of proper waste disposal. Overall, the findings indicate that deep learning-based character education has shifted from environmental awareness to fostering environmentally conscious attitudes and behaviors, although levels of awareness and consistency of behavior still vary among students.

5. Discussion

5.1 Implementation of Deep Learning-Based Character Education

Research findings indicate that the implementation of deep learning-based character education is determined by the interrelationships between communication, resources, disposition, and bureaucratic structure. This corroborates Edward III's (1980) assertion that the effectiveness of policy implementation does not depend on a single factor in isolation, but rather on the interaction of various implementation elements. In the educational context, communication serves not only to convey policy to implementers but also to translate policy objectives into learning practices. This finding aligns with Tawai and Johanis (2025) and Habsana et al. (2026), who position communication as a crucial element in bridging policy with its implementation.

Resources and disposition demonstrate that the capacity and commitment of implementers are strategic factors in implementation. The availability of basic facilities is insufficient without the ability of teachers to apply deep learning contextually and meaningfully. This is relevant to Bächtold et al. (2025), Lu et al. (2023), and Zhang et al. (2025), who highlight the importance of active engagement and meaningfulness in deep learning approaches. At the same time, implementer commitment allows policy objectives to be internalized into school practices and culture. This resonates with Thomas et al. (2023), who highlight the importance of the school environment in supporting character development.

From a bureaucratic structural perspective, the division of responsibilities and coordination demonstrate that character education is more likely to be implemented consistently when it is the responsibility of the school organization, not just subject teachers. From Edward III's (1980) perspective, a supportive structure can reduce fragmentation and clarify implementation responsibilities. Thus, these four dimensions work complementary in translating deep learning-based character education policies into school practice.

5.2 Supporting and Inhibiting Factors for Implementation

Supporting and inhibiting factors indicate that the implementation of deep learning-based character education takes place within an educational ecosystem. Leadership, teacher capacity, school culture, institutional support, student, family, and community participation collectively influence the quality of implementation. Specifically, school culture provides space for repeated practice of character values so that character formation does not stop at the transfer of knowledge. This is in line with Hartatik et al. (2021) and Thomas et al. (2023), who emphasize the importance of the school environment and practices in supporting character development.

Conversely, the unequal understanding of deep learning among teachers indicates a gap in implementation capacity. This finding is relevant to Wijayanti and Rahmelia (2025) and Kandia et al. (2026), who identified pedagogical and structural barriers to the implementation of character education. Therefore, teacher professional development needs to be directed at the ability to translate deep learning principles into contextual, reflective, collaborative, and problem-solving-oriented learning, not just understanding policy concepts.

Suboptimal family involvement also indicates the need for consistent character building between schools and the environment outside of school. Values developed through learning and school culture have the potential to be stronger if reinforced by family and

community. Therefore, sustainable character education requires synergy between schools, families, and the community, not just strengthening the classroom learning process.

5.3 Character Education Based on Deep Learning and Environmental Concern

The contribution of deep learning-based character education to environmental awareness can be understood as a process that moves from understanding to internalizing values and actions. The findings regarding environmental knowledge, attitudes, and behavior are relevant to Lickona (1991), who identified moral knowing, moral feeling, and moral action as interrelated components in character formation. In the context of this research, knowledge of environmental issues reflects the cognitive dimension, while concern and responsibility demonstrate the internalization of values, while actions to protect the environment represent the actualization of values in behavior.

This interpretation aligns with Brown et al. (2023), who demonstrated the positive effects of character education programs on student development. In an environmental context, Van De Wetering et al. (2022) found that environmental education benefits children and adolescents' environmental knowledge, attitudes, intentions, and behaviors. Mónus (2022) also demonstrated a link between school environmental education and pro-environmental attitudes and behaviors. This indicates that environmental awareness is more likely to develop when knowledge is reinforced through consistent experience and practice.

Social studies learning provides a relevant context because it allows students to connect environmental issues to social life and the conditions around them. This aligns with Lobja et al. (2023) regarding the integration of character values in social studies learning, as well as Lee (2023) and Araneo (2024) regarding the importance of education in building environmental awareness and sustainability. Contextual learning can thus bridge environmental knowledge with the formation of attitudes and actions.

Overall, this study demonstrates that fostering environmental awareness through deep learning is not solely a pedagogical issue, but also a policy implementation issue. A meaningful learning approach requires clear communication, adequate teacher capacity, commitment from implementers, and a supportive school structure. This study's contribution lies in integrating pedagogical perspectives and policy implementation to explain how deep learning-based character education is translated into social studies instruction and related to the development of students' environmental awareness knowledge, attitudes, and behaviors.

6. Conclusion

This study concludes that the implementation of deep learning-based character education in social studies at SMP Negeri 1 Muara Jawaq has been carried out through the interconnectedness of four dimensions of policy implementation: communication, resources, disposition, and bureaucratic structure. Communication at the organizational and learning levels, resource support, implementer commitment, and coordination between school actors form the basis for translating the policy into learning practices and school culture. However, implementation still requires strengthening, especially in terms of equitable teacher understanding of deep learning, optimizing learning media, and increasing family involvement. These findings indicate that the success of deep learning-based character education depends not only on the

pedagogical approach but also on the school's capacity to implement the policy consistently.

This implementation contributes to students' environmental awareness, which is reflected in their knowledge, attitudes, and behavior. Contextual and meaningful learning enables students to understand environmental issues, develop responsibility and concern, and translate these values into daily actions. Thus, this study confirms that the integration of deep learning, character education, and policy implementation can be a relevant approach to strengthening environmental awareness through social studies learning.

Practically, schools need to strengthen teacher competency development in the application of deep learning, the use of media and environmentally-based learning projects, and collaboration between schools, families, and the community. At the institutional level, ongoing coordination and monitoring of implementation are necessary to ensure that character education does not rely on individual teacher initiatives. Future research could involve schools with diverse characteristics and use a comparative or mixed methods approach to further examine the relationship between implementation quality, the deep learning approach, and the development of students' environmental awareness.

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