

## Axiological Perspective in the Implementation of Socio-Scientific Issues (SSI) Learning to Improve Environmentally Caring Character

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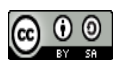
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**Abstract:** This study aims to analyze the effectiveness of implementing the Socio-Scientific Issues (SSI) learning model in improving students' environmental care character and to examine these changes from an axiological perspective as a process of internalizing values. This study employs a quantitative descriptive design, with questionnaire results and literature reviews as the primary data sources. This study focuses on Akidah Akhlak (Islamic creed and ethics) for grade III students, with a total of 20 students at Madrasah Ibtidaiyah (MI) Hidayatussibyan. Data collection was carried out using an environmental care character questionnaire on a Likert scale of 1-4, and the data were analyzed with n-gain. The results of the analysis of students' environmental care attitude achievement showed a significant increase from 25% of students with the category of caring enough, 45% of students with the category of caring, and 30% of students with the category of very caring, to 100% of students with the category of very caring. The n-gain in this study was 0.7, which was high. Axiologically, this research shows that SSI learning serves as a value-transformation mechanism through three stages: value exposure (students are confronted with real environmental dilemmas), moral deliberation (students weigh the impacts, norms, and consequences), and value enactment (students translate decisions into real actions).

**Keywords:** Axiological analysis, environmentally caring character, socio-scientific issues



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### A. Introduction

Environmental issues are an increasingly pressing global challenge because they directly impact the sustainability of life on Earth. Indonesia, for example, is still facing problems such as pollution, suboptimal waste management, and low public awareness of environmental protection (Hernawan, Darmawan, & Ali, 2022). This condition shows that environmental issues are not only structural but also closely related to individual behavior, so instilling a caring character from an early age is very important, especially

through basic education, which is the initial stage of forming students' values and habits (Alwi, Sutajaya, & Suja, 2024). However, the results of initial observations in Grade IIIA of MI Hidayatussibyan showed that students' caring character has not been consistently implemented in daily life, as seen from the continued habit of littering, lack of awareness in carrying out cleaning duties, and limited supporting facilities, such as the lack of trash cans in the classroom. This finding is supported by pre-research data showing that 25% of students are in the caring enough category, 45% in the caring category, and 30% in the very caring category, indicating that most students have not reached the optimal level of environmental awareness. This condition confirms the existence of a real gap between the objectives of character education and findings in the field, so that regularly designed learning interventions are needed so that environmental care values are not only understood cognitively, but also internalized in daily attitudes and behavior, because the internalization of learning changes knowledge and skills into implicit knowledge, influencing a person's attitudes and behavior (Syahbana, Asbari, Anggitia, & Andre, 2024; Zebaloğlu, 2024).

Conceptually, character education stems from the ideas of Ki Hadjar Dewantara, who emphasized sharpening intellectual intelligence to cultivate a strong, good personality and character (Hikmasari, Susanto, & Syam, 2021). Environmentally conscious character education is defined as attitudes and behaviors that strive to maintain, preserve, and improve the environment sustainably through habits and concrete actions (Nada, Fajarningsih, & Astirin, 2021). Education plays a strategic role as a medium for internalizing values, where the learning process not only transfers knowledge but also shapes students' awareness and behavior towards the environment. The integration of character education with contextual activities has been proven to significantly increase students' social and environmental awareness and behavior (Aura, Supiandi, & Nugraha, 2023). The goal of education is to guide the younger generation toward intelligence and virtuous behavior (Lickona, 2019). The implementation of SSI is relevant because its steps support the cultivation of environmental care attitudes through 5 SSI steps: problem analysis, clarification of the science, refocus on the socio-scientific dilemma, role-playing task, and meta-reflective activity (Sadler, 2011). These SSI steps will support the achievement of environmental care attitude indicators, namely respecting the environment by not damaging it and making it harmonious, maintaining environmental cleanliness and health, and saving energy and using empty land by planting plants or reforestation (Johns & Pontes, 2019).

Previous research on SSI has shown that SSI learning plays a significant role in improving learning quality, particularly in cognitive aspects, scientific literacy, and higher-order thinking skills. In general, integrating SSI into contextual learning models, such as Problem-Based Learning (PBL), enables students to actively analyze real-world issues, thereby improving problem-solving and evidence-based decision-making skills (Alpianti & Amelia, 2024; Genisa, Subali, Djukri, Agussalim, & Habibi, 2020). Furthermore, the development of gadget-based interactive multimedia (GBIM) on SSI can improve elementary school students' science skills (Suryanti, Widodo, &

Yermiandhoko, 2021). Research by (Magtibay, 2024) developed learning materials by embedding socio-scientific issues within science teaching to provide a meaningful social context for students. Although previous research has shown that SSI learning is effective in improving cognitive abilities, scientific literacy, and higher-order thinking skills, fundamental gaps remain in the direction and depth of the studies. Most studies tend to focus on students' cognitive and academic achievements, making it crucial for this research to comprehensively examine affective achievement and the process of internalizing values, particularly those related to environmental concerns. Furthermore, SSI has been implemented in previous research almost exclusively in the context of science learning, with an emphasis on strengthening scientific literacy and evidence-based reasoning. It indicates limited exploration of SSI in other fields of study, particularly in subjects explicitly oriented towards value and moral formation, such as Akidah Akhlak (Islamic creed and ethics).

In implementing environmental cleanliness, schools focus on the Adiwiyata program, which systematically integrates environmental values into school culture. This program functions through four interconnected components: environmentally conscious institutional policies, an integrated curriculum, participatory activities involving the school community, and environmentally friendly facility management (Kartini, Surachmi, & Rondli, 2024; Rozi, Sekarsari, & Faizin, 2026). Previous research on environmental character education has generally been descriptive and focused on implementing programs such as Adiwiyata, without in-depth examination of how these values are internalized through classroom learning. From an axiological perspective that emphasizes the dimensions of values, ethics, and meaningfulness, knowledge is rarely used as a basis for learning design and analysis. As a result, learning tends to stop at the level of understanding and analysis, without encouraging the transformation of students' attitudes and behaviors.

Based on these considerations, this study offers novelty by integrating the SSI learning model into the subject of Aqidah Akhlak and an axiological perspective, through the distribution of questionnaires designed to capture changes in environmental care character in greater depth. The importance of this study lies not only in assessing the increase in environmental care character quantitatively, but also in revealing how the value of care is understood, felt, and manifested in students' behavior. Thus, this study aims to analyze the effectiveness of applying the SSI learning model in improving students' environmental care character, while examining these changes from an axiological perspective as a process of value internalization.

## **B. Method**

This study uses a quantitative, descriptive approach, drawing on exploratory or limited research. Quantitative descriptive research is the description, examination, and explanation of phenomena as they are, and the drawing of conclusions from observable phenomena using numbers (Isrotun, Sumarno, & Muhtarom, 2023). The research subjects were 20 students from class III A at MI Hidayatussibyan, with the research objective

focused on environmental awareness and caring attitudes. Data were collected through a Likert-scale questionnaire with a score range of 1–4, containing both positive and negative statements, in which positive items were scored as always (4), often (3), sometimes (2), or never (1). In contrast, for negative items, the opposite applies (Petri-Romão et al., 2024). The questionnaire focused on environmental awareness, personal behavior, and environmental literacy (Johns & Pontes, 2019). Data analysis was carried out quantitatively through scoring, percentage calculations, and comparisons of pretest and posttest results to determine the improvement and effectiveness of learning using n-gain.

Furthermore, interpretation was carried out using Creswell and Clark's (2018) qualitative data analysis theory. This research was conducted in four learning meetings by implementing SSI. The grid of environmental care attitude indicators is as follows:

Table 1. Grid of indicators of environmental concern attitudes

Main Aspect	Indicator	Number
Environmental Sustainability	No damage to plants, care facility	1, 11, 13
Cleanliness Environment	Throw away trash, keep cleanliness	5, 15, 16
Maintenance Environment	Water and nurse the plant	4, 9, 14, 18
Comfort Environment	No noise	2, 12
Participation Environment	Follow clean & green activities	6, 10, 19
Care & Social Attitude	Remind friend, no indifference	3, 16
Interest in the Environment	Like planting, don't consider boring	8, 17
Cleanliness Self	Wash hands	7
Retrieval Decision	Decisions related to environmental issues, taking into account social and moral impacts	20

Table 2. Environmental Concern Character Questionnaire Assessment Categories

Presentation	Category
0% - 20%	Not care
21% - 40%	Lack of Attention
41% - 60%	Just Care
61% - 80%	Care
81% - 100%	Very Caring

Source: (Amnah & Ferazona, 2021)

### C. Results and Discussion

#### Results

In Figure 1, the indicators of not damaging plants and maintaining facilities achieved the highest percentage of 99%, indicating that students have a strong awareness of maintaining the sustainability of the physical environment around them. Indicators of disposing of garbage in its place, maintaining cleanliness, participating in clean-up and greening activities, interest in planting, and reminding friends to maintain their respective

environments achieved a 98% rate, indicating that student concern is not only personal but also develops into a social dimension. A more active aspect of environmental care, namely watering and caring for plants, reached 96%, and wise decision-making obtained a percentage of 98%. Meanwhile, indicators of maintaining environmental comfort through behaviors, such as not making noise and washing hands as part of personal hygiene, obtained percentages of 91% and 90%, respectively.

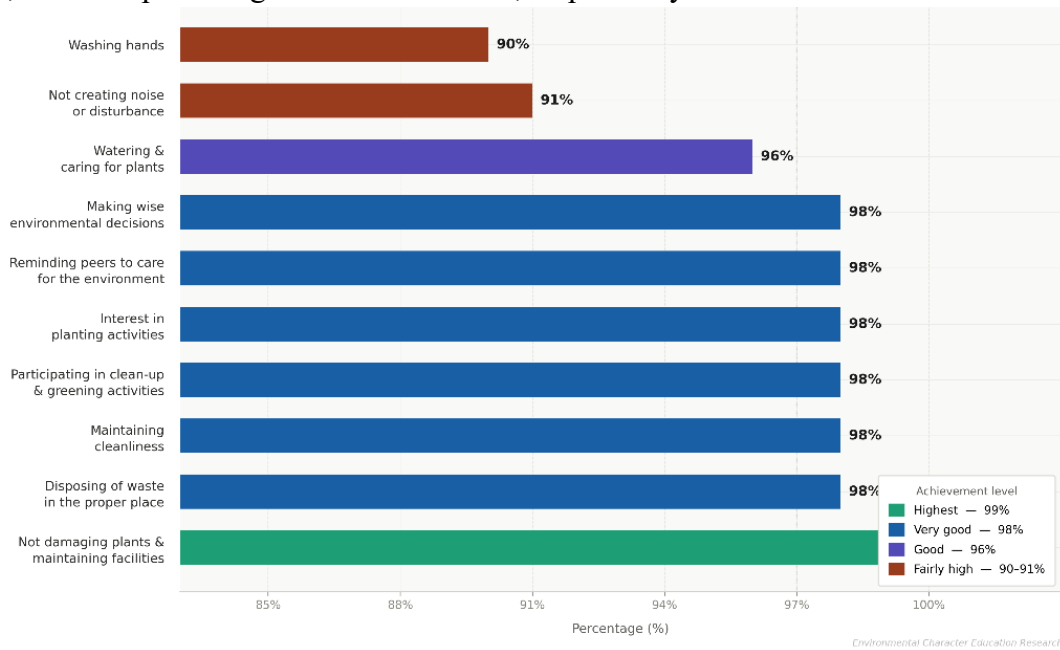


Figure 1. Results of the environmental concern character questionnaire indicators

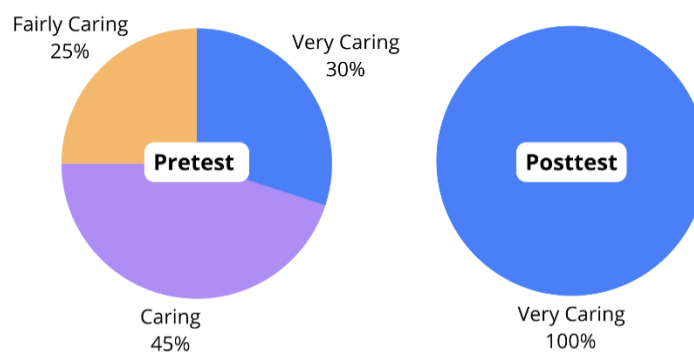


Figure 2. Pretest and Posttest Results

Figure 2 shows a very significant change between the initial and final conditions of the study. Before the treatment, only 30% of students were in the very caring category, 45% in the caring category, and 25% in the moderately caring category. After implementing the SSI model, 100% of students were placed in the very caring category. This drastic change is confirmed by the N-gain analysis, which shows a value of 0.7, included in the high category. Thus, SSI-based learning is effective in improving students' environmental character.

The relationship between indicator achievement and category changes can be understood through the character-building mechanisms that occur at each stage of SSI learning. In the first stage, "let's find out," students are introduced to real-world problems in their environment, such as waste and disasters caused by human activity. This stage not only arouses curiosity but also begins to foster students' axiological awareness that environmental problems have moral and responsibility dimensions, not simply scientific ones. This initial awareness is deepened in the second and third stages, "let's read" and "let's think," where students identify the causes and impacts of environmental problems and discuss various alternative solutions. This process encourages students to integrate scientific knowledge with social and ethical considerations, thereby developing value-based argumentation skills that ultimately contribute to high levels of reminding friends and participation in greening activities, as reflected in Figure 1. The culmination of this process is seen in the fourth stage, "let's play roles," where students demonstrate development in the axiological realm by choosing actions that are both scientifically correct and ethically appropriate. Decisions that emerge in role-playing, such as properly disposing of trash, keeping the classroom clean, and caring for plants, are concrete manifestations of the internalization of values of environmental care, responsibility, and sustainability, which explains why the behavioral indicators in Figure 1 reach such high percentages. The entire process is then consolidated in the fifth stage, let us reflect, where students not only understand the concept but are also able to evaluate their attitudes and actions based on the values they have learned. Through reflection, students connect learning experiences with everyday life and realize that every action towards the environment has moral and social implications. This awareness becomes the foundation for changes in the overall category of concern, as shown in Figure 2.



Figure 3. Student Activities

The results of the SSI implementation are supported by the observation data in Figure 3, which shows changes in student behavior during the learning process. Students began to habitually dispose of trash properly, actively participate in cleaning activities, and demonstrate concern through caring for plants in the school environment. Furthermore, the classroom atmosphere became more conducive as students made efforts to reduce noise during learning. Interviews also revealed that SSI-based learning made students better understand the importance of environmental protection and fostered a sense of responsibility for active participation. Students also stated that discussions and hands-on practice made learning more engaging and less boring, particularly in planting and caring for plants. Overall, implementing SSI not only improved students'

understanding but also strengthened the internalization of values reflected in everyday behavior. These findings align with the axiological perspective that education should make a meaningful contribution to life and character development (Ratnasari, Hakam, Hidayat, & Kosasih, 2024), where values are not only understood conceptually but also internalized through concrete practices.

## **Discussion**

Character education can be effectively implemented if students practice habits that embody character values. This principle is reflected in SSI learning, where students not only learn cognitively but also engage in real activities such as cleaning the classroom, planting and caring for plants, managing waste banks, and participating in environmental awareness campaigns. In constructivist theory, learning occurs through the active behavior of subjects who create understanding through interaction with the environment (Azzahra, Ali, & Bakar, 2025). SSI learning is relevant because it can increase students' social awareness and responsibility, as well as their collaboration and communication skills through real-world, issue-based projects. Based on the results of the study, the implementation of SSI showed a significant increase in students' environmental care character, from the initial condition of 25% in the category of caring enough, 45% caring, and 30% caring very caring to 100% of students in the category of caring very, with an N-gain value of 0.7 (high category). In addition, the achievement of behavioral indicators showed high consistency, including not damaging plants (99%), maintaining cleanliness (98%), participating in environmental activities (98%), and caring for plants (96%). These data indicate that SSI learning not only affects cognitive aspects but also leads to actual behavioral changes, reflecting the internalization of environmental values. This study applies the five main syntaxes of SSI: Let's Find Out, Let's Read, Let's Think, Let's Role Play, Let's Reflect, and the additional syntax Let's Act.

This study further found that SSI significantly improved character, as evidenced by a 100% increase in the very caring category. This suggests that integrating reflective activities and concrete actions in SSI strengthens the process of value internalization, a process that has not been thoroughly explored in previous research. Axiologically, education emphasizes the formation of students' values, attitudes, and character, so that learning functions not only as a transfer of knowledge but also as a means of constructing meaning and social responsibility (Prisecaru, 2023). SSI learning in this study functions as a mechanism for value internalization through the stages of issue exposure, moral reflection, and concrete action. It is particularly evident in the "Let's Think" stage, which develops student awareness through moral discussions (Edelheim, Joppe, Flaterty, & Hockert, 2022), and in the "Let's Act" stage, which reflects a pragmatic approach in which values are tested through real-life practice. In addition, social interactions in learning reflect social constructivism in axiology, where values are formed through social processes and interactions between individuals in a society (Amalia, Rakhmat, & Idawati, 2025). The implication is that SSI-based learning can be

an effective strategy in environmental character education because it fully integrates cognitive, affective, and behavioral aspects. SSI learning not only improves learning outcomes but also fosters sustainable habits and social responsibility in students, making learning more meaningful and contextualized in real life.

### **SSI learning activities**

#### ***Let's find out***

Identification, or "let's find out" activities are the first step in SSI-based learning (see Figure 4), where students observe the conditions of the surrounding environment. Observation picture: a video that encourages students to identify real-life problems that need to be addressed. This activity encourages them to think critically and to provide simple solutions for a clean environment. Arestu et al. (2019) stated that observation activities like this are effective in raising awareness of environmental issues. SSI learning at the elementary school level can open significant opportunities to raise awareness of environmental and health issues and to analyze social problems (Pereira et al., 2025). Therefore, this activity is an important foundation in building value awareness. From an axiological perspective, at the Let's Find Out stage, students begin to build value awareness through an introduction to environmental realities, reflecting the initial stage of value awareness in axiology.



Figure 4. Let's Find Out Activity

#### ***Let's read***

After students identify the existing problems, they expand their understanding by reading texts that discuss moral values, religious teachings, and scientific facts related to the importance of environmental protection. Researchers provide reading materials on environmental ethics to provide a foundation of knowledge that strengthens understanding. Safitri et al. (2023) revealed that reading can enrich students' social insights. The Let's Read (see Figure 5) stage strengthens the epistemological dimension of values by providing a foundation of moral and scientific knowledge as a basis to assess actions.



Figure 5. Let's Read Activity

### ***Let's think***

Based on Figure 6, they held group discussions that encouraged students to exchange ideas, consider opinions, and develop solutions to environmental problems from a social and scientific perspective (Smit, Rietz, & Büchel, 2025). This discussion fosters communication skills, collaboration, and social responsibility. Tenrisau (2023) emphasizes that collaborative discussion supports the development of social skills and decision-making. The Let's Think stage is at the heart of the axiological process, where students deliberate on values through discussion, consider moral consequences, and develop responsible decisions.



Figure 6. Let's Think Activity

### ***Let's role-play***

This research employs contextual learning through role-playing (see Figure 8). Through this activity, students experience situations that depict conflicts and solutions related to environmental problems, such as the role of someone who litters or becomes a leader in a tree-planting activity. Through these experiences, they also learn the impact of careless actions on the environment and the importance of the values of responsibility and empathy. Atik and Prayitno (2025) state that role-playing is an effective way to instill contextual social understanding. This activity supports the development of environmentally conscious characters in a meaningful way. Role-playing allows students to directly experience social dilemmas, enabling values such as responsibility and empathy to be formed through social interactions, in line with social constructivism in axiology.



Figure 7. Let's Role Play

### ***Let's reflect***

This reflection is reinforced by teacher feedback, which helps them recognize changes in attitudes and behavior. According to Maudiya et al. (2024), directed reflection can build constructive self-awareness. Based on Figure 8, The reflection activity helps students evaluate their awareness of cleanliness, greening, and sustainability in a specific way, leading to broader, more informed decision-making.

The axiological perspective in reflection activities helps students evaluate and interpret these experiences, so that values become part of individual awareness.

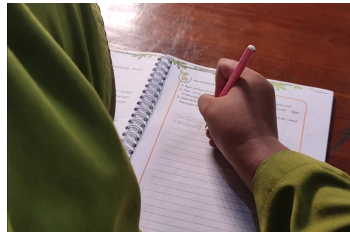


Figure 8. Let's Reflect Activity

### ***Let's take action***

At the end of the "let's take action" activity (see Figure 9), this marks the peak of applying environmental care values through real action. Students do activities such as cleaning classrooms and courtyards, planting and caring for plants, sorting and managing waste through waste banks, and conducting environmental awareness campaigns. Rukiyati (2019) stated that hands-on practice enhances students' creativity, while Zikriana et al. (2023) emphasized that this type of hands-on activity is effective in fostering sustainable environmental awareness habits. The "Let's take action" activity reflects a pragmatic approach to axiology, where the implementation of values determines their truth.



Figure 9. Let's Take Action Activity

### **D. Conclusion**

The Socio-Scientific Issues (SSI)-based learning in this study demonstrates a close relationship with the axiological perspective, as it directs knowledge not only toward cognitive understanding but also toward the formation of students' actual values and behaviors. This is reflected in the questionnaire results, which showed that most indicators of environmental character were in the high category, indicating that students were able to assess, respond to, and apply environmental values in their behavior. These findings indicate that SSI learning has the potential to facilitate the internalization of

values, namely by connecting knowledge with attitudes and actions in concrete ways. Theoretically, this study contributes to strengthening axiological studies in education by demonstrating how the learning process can be a means of internalizing values through systematic stages. The results of this study can be used as an alternative learning strategy to support environmental character education in elementary schools. This study has limitations: a pre-experimental design without a control group and limited subject coverage to one class. Future research is recommended to use a quasi-experimental design with broader subject coverage and include long-term follow-up measurements to produce more comprehensive and generalizable findings.

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