

The Role of Sustainable Education and Climate Education in Realizing the SDGs in Indonesia

Masriani Yusmiati Pae¹

¹ Universitas Sarjanawiyata Tamansiswa, Yogyakarta, Indonesia

Abstract

Article history:

Received: January 11, 2022

Revised: February 20, 2022

Accepted: April 25, 2022

Published: June 30, 2022

Keywords:

Climate Change Education,
Curriculum,
Development,
Indonesia.

Identifier:

Nawala

Page: 18-34

<https://nawala.io/index.php/ccese>

Sustainable development is a global agenda based on the Sustainable Development Goals (SDGs) with the primary aim of achieving a balanced integration of social, economic, and environmental dimensions. One of the most significant strategies in supporting the achievement of the SDGs is education, particularly through the approach of Education for Sustainable Development (ESD), which emphasizes the integration of knowledge, skills, values, and sustainability-oriented attitudes into the curriculum. Education plays a dual role: not only in producing globally competitive human resources, but also in shaping resilient individuals capable of adapting to the complex challenges of the twenty-first century, including climate crises, social inequality, rapid urbanization, and environmental degradation. In the Indonesian context, the urgency of Climate Change Education is even greater due to the country's high vulnerability to climate-related impacts. However, the implementation of sustainability-based education still faces considerable gaps between government policies and school-level realities. This study aims to analyze the role of education in supporting sustainability using a qualitative literature review. The findings highlight the importance of cross-curricular integration, teacher capacity strengthening, and responsive policy development addressing climate and sustainability issues.

1. Introduction

The Sustainable Development Goals (SDGs) were born from the UN Conference on Sustainable Development in Rio de Janeiro in 2012, then officially adopted in 2015 as a continuation of the Millennium Development Goals (MDGs). The SDGs target global achievements by 2030 to create a better, inclusive, and sustainable future. With 17 interconnected main goals, the SDGs cover social, economic, environmental, and legal and governance dimensions (García et al., 2021). However, their achievement faces major challenges in the form of the climate crisis, social inequality, environmental damage, and rapid urbanization. The climate crisis has caused widespread impacts such as rising global temperatures, extreme weather, and disruption to food and health systems. Social inequality deepens the gap in access to education, health, and resources. Meanwhile, uncontrolled urbanization risks exacerbating socio-economic problems and ecosystem damage.

In this context, education is seen as a vital foundation for preparing Human Resources (HR) capable of facing these global challenges. Education equips individuals with the knowledge, skills, and values needed to compete in the era of globalization while also having the resilience to face crises. The concept of Education for Sustainable Development (ESD) is present as one of the key approaches that aims to form a young generation with broad knowledge, who are critical, literate, and have life skills oriented toward sustainability. ESD does not only emphasize the transfer of knowledge but also the formation of attitudes and values that encourage real contributions to the achievement of the SDGs. Quality

education, which is the core of the 4th SDG, has a close connection with other sustainable development goals (Unterhalter, 2019).

Improving the quality of education contributes to human development, economic growth, and the strengthening of social welfare. This also supports the achievement of SDGs targets in other sectors, such as poverty eradication, food security, and environmental protection. Therefore, education plays a dual role as a fundamental right and a transformative instrument in sustainable development. One of the biggest challenges faced in sustainable development is climate change. This phenomenon is not only in the form of rising global temperatures and shifting weather patterns, but it also threatens food availability, public health, and social stability. In the context of developing countries like Indonesia, vulnerability to the impacts of climate is further exacerbated by socio-economic factors, such as poverty and limited access to education. This confirms the importance of Climate Change Education as an integral part of the national education system (Feinstein & Mach, 2020).

Climate change-based education focuses on three main dimensions: mitigation, adaptation, and understanding and awareness. Mitigation emphasizes changes in behavior and policies to reduce the causes of climate change. Adaptation emphasizes the development of capacity to face the already real climate impacts, for example, food security strategies during a long drought. Meanwhile, the understanding and awareness dimension emphasizes the importance of climate literacy, critical thinking skills, and collective awareness of climate issues. To optimize the role of education in facing these global issues, cross-curricular

integration becomes an important strategy. Integration between science, social studies, geography, sociology, and even humanities subjects can create holistic learning.

In this way, students understand the connection between science, social conditions, and environmental challenges. Unfortunately, a gap still occurs between government policies that support the integration of sustainable education and the reality of implementation in schools. A lack of resources, teacher limitations, and weak education management at the local level are the main obstacles. In addition, research on the effectiveness of climate change education is still limited, especially in developing countries like Indonesia. In fact, such research is important to evaluate the right strategies for developing a climate-based curriculum. This confirms the need for a deeper analysis related to how education can function as a means of social transformation in facing climate change and supporting the achievement of the SDGs.

2. Literature Review

2.1. Sustainable Development-Based Education

The concept of Education for Sustainable Development (ESD) was born from the urgent need to integrate sustainability issues into the global education system in a more systematic and directed way (Annan-Diab & Molinari, 2017). This idea began to receive serious attention since the Earth Summit in 1992 in Rio de Janeiro, which resulted in Agenda-21. The document explicitly confirms that education is the main driver and an important foundation for realizing sustainable

development. Through ESD, education is no longer seen only as a means of knowledge transfer, but as a transformative instrument that can equip students with a set of important competencies to face the complexities of the 21st century. ESD covers various broad aspects of learning, such as environmental literacy, critical thinking skills, problem-solving abilities, and the development of caring attitudes toward ecosystem sustainability. Its main goal is to form a generation that is not only academically smart but also has social sensitivity and care for the environment.

With this provision, the young generation is expected to be able to face global challenges, including issues of social inequality, environmental degradation, and the increasingly competitive dynamics of the global economy (de Looze et al., 2019). In line with the Sustainable Development Goals, especially the fourth goal concerning quality education, ESD has a close connection with the achievement of other goals. Research shows that improving the quality of education can contribute significantly to reducing poverty rates, improving public health, promoting gender equality, and strengthening social capacity in facing climate change. Meanwhile, in many developing countries, the implementation of ESD is more directed at issues of food security, increasing access to clean water, health education, and the protection of basic ecosystems that are vital for the survival of the community.

2.2. Climate Change Education

Climate change education is a specific derivative of Education for Sustainable Development (ESD) that more focusedly emphasizes the urgency of climate literacy in the learning process. This concept was born from the awareness that climate change is not just an environmental issue, but also a social, economic, and political

problem that has a broad impact on the sustainability of human life. This can be done through simple behavioral changes such as saving electricity, using public or environmentally friendly transportation, reducing the consumption of single-use plastics, and implementing sustainable consumption patterns. Adaptation emphasizes increasing the capacity of individuals and communities to face climate disasters, such as droughts, floods, and heat waves, so that people can be more resilient and ready to face the risks. Meanwhile, understanding focuses on the development of media literacy, critical thinking skills, and public awareness of the urgency of climate issues in daily life.

Several international studies have confirmed the effectiveness of climate change education. Shin (2018) showed that the application of a problem-based learning curriculum was proven to increase students' awareness, motivation, and self-confidence in facing climate change issues. Lai et al. (2020) emphasized the importance of cross-subject integration, which is capable of significantly improving students' communication skills regarding climate issues. Furthermore, Ke et al. (2021) found that the integration of climate education with socio-scientific learning plays a role in increasing students' critical literacy, creativity, and analytical abilities. However, in the context of Indonesia, such research is still relatively limited, even though the level of vulnerability to climate change in various regions is very high. This confirms the importance of further research to develop climate learning strategies that are more in line with the local context and the needs of the community.

3. Methods

This research uses a qualitative approach with a literature study design. The qualitative approach was chosen because this research aims to understand in depth the concepts, practices, and implementation challenges of Education for Sustainable Development (ESD) and climate change education in the context of achieving the Sustainable Development Goals (SDGs) in Indonesia. Through this method, researchers can explore the meaning, interpretation, and social dynamics that accompany education policies and implementation in the field. Research data was obtained from various literature sources, including journal articles, official reports from the UN, UNESCO, and the Ministry of Education, as well as previous research results related to sustainable education and climate education. The literature sources used were selected with criteria of relevance to the issues of SDGs, sustainable education, and the context of Indonesia as a developing country that is vulnerable to the impacts of climate change.

Data analysis was carried out through the stages of data reduction, data presentation, and conclusion drawing. Data reduction includes the process of selecting relevant information from various literature, then categorized according to themes, such as the role of education in supporting the SDGs, cross-disciplinary curriculum integration, the gap between policy and practice, and the effectiveness of climate change education. Data presentation is carried out by organizing the results of the literature review into a systematic narrative so that it facilitates the understanding of the relationship between variables. The final stage is conclusion drawing, where researchers compile interpretations regarding the position of

education in supporting sustainable development, implementation challenges, and opportunities for future policy development (Ferguson et al., 2021).

Data credibility is maintained with the technique of source triangulation, which is comparing the results of studies from various academic literature and official documents. In addition, peer-reviewed journals are prioritized to maintain the validity of the findings. The qualitative method is considered appropriate for this research because the issue of sustainable education and climate change cannot only be measured through quantitative data, but is better understood through complex social, cultural, and policy contexts. Thus, this research is able to provide a comprehensive understanding of how education functions as an instrument of social, economic, and environmental transformation, and the extent of its contribution to the achievement of the SDGs in Indonesia.

4. Results and Discussion

The results of the literature review show that education has a strategic position in supporting the achievement of all Sustainable Development Goals (SDGs). Education is not only understood as a process of knowledge transfer but also as an important vehicle for forming character, skills, and collective awareness that can encourage sustainable development. As part of the fourth SDG, quality education contributes directly to human development, economic improvement, and the strengthening of social cohesion. In other words, education is the main pillar in producing human resources who are smart, creative, and competitive, as well as having character and resilience. Furthermore, education also has an indirect impact

on other SDGs goals, such as poverty eradication, improving public health, promoting gender equality, and strengthening efforts to protect the environment which is now an urgent global issue (Avelar et al., 2019).

In its development, Education for Sustainable Development (ESD) emerged as a transformative approach that emphasizes the connection between knowledge, skills, values, and attitudes needed to answer future challenges. ESD emphasizes that education is no longer just teaching environmental literacy, but also honing critical thinking skills, problem-solving skills, cross-field collaboration abilities, and ethical awareness. This is important because global challenges such as climate change, rapid urbanization, environmental degradation, and social inequality require collective solutions that cannot be overcome by one discipline alone. Sustainability-based education encourages the synergy of multidisciplinary knowledge as well as real action at the individual and community level (Braßler & Sprenger, 2021).

In Indonesia, the concept of ESD began to be integrated gradually into education policy through the national curriculum (Haridza & Irving, 2017). Several government programs, such as strengthening the Pancasila student profile, character education, and the independent learning curriculum policy, basically have a close connection with the principles of ESD. These programs aim to prepare students who are not only intellectually smart, but also have strong personalities, care for the environment, and are able to contribute to socio-ecological sustainability. Even so, the implementation of this policy still faces a gap between the design at the regulatory level and the reality of practice in schools. The difference in the quality of education between schools in urban and rural areas, the limited capacity of teachers to integrate

sustainability material, and the minimal relevant learning resources, are serious obstacles that need to be addressed immediately.

International literature consistently confirms the importance of cross-curricular integration in the application of ESD. A study conducted by Bascopé, Perasso, and Reiss (2019) showed that learning that connects science, social sciences, and humanities is far more effective in increasing students' sustainability literacy compared to a separate, conventional approach. This proves that sustainability demands a more holistic and contextual approach. In the context of Indonesia, a similar practice can be applied by integrating environmental issues in science subjects, discussing social justice problems in social studies, and building ethical awareness and moral reflection through humanities subjects. In this way, students not only understand the concept theoretically, but are also able to connect it to real life.

In addition, education based on sustainable development is not only oriented toward students as individuals, but also involves the entire school community as a whole. The whole-school approach concept introduced by UNESCO emphasizes that schools should be a center for sustainability practices, both in terms of curriculum, organizational culture, and environmental management. Through this approach, schools can play an active role in implementing environmentally friendly practices, for example through efficient energy management, recycling-based waste management, school greening, and the involvement of the surrounding community in educational programs. In Indonesia, the implementation of this concept is indeed still limited, but it has started to be seen in the initiatives of several environment-

based schools known as the Adiwiyata school program. The program seeks to make schools agents of change by accustoming students and teachers to behave in an environmentally friendly way in their daily lives.

Thus, sustainable development-based education has great potential to support the achievement of the SDGs as a whole. Education can be a driver of social transformation as well as a strategic instrument in preparing a future generation that is more adaptive and responsible. However, for this potential to truly be realized, consistent strengthening of public policy, increasing teacher capacity through continuous training, and providing adequate and contextual learning resources are needed. Without these concrete steps, ESD implementation risks stopping only at the level of policy discourse without having a real impact in the field. Therefore, collaboration between the government, educational institutions, civil society, and the business world is very important to ensure education truly becomes a strong foundation in realizing the goals of sustainable development.

The literature review consistently confirms that climate change is a real threat that requires a fast, directed, and integrated response from various sectors of human life, including through the education sector. In Indonesia, the impact of climate change is already very real and increasingly difficult to ignore. Various indicators show an increase in the average annual temperature, changes in rainfall patterns, and an increase in the frequency and intensity of natural disasters such as floods, droughts, landslides, and heat waves. In addition, the food crisis is also starting to threaten due to the disruption of agricultural production, while threats to public health appear through an increase in climate-based diseases, such as malaria, dengue

fever, and respiratory illnesses. This condition shows that climate change education is no longer just an additional option, but is one of the main strategies that must be prioritized to build collective awareness, increase the community's adaptation capacity, and encourage real mitigation actions at all levels.

Climate change education generally focuses on three main pillars, namely mitigation, adaptation, and understanding and awareness (Molthan-Hill et al., 2019). The first pillar, mitigation, is directed at systematic efforts to reduce carbon emissions and the human ecological footprint. This can be done through simple behavioral changes such as saving electricity, using public or environmentally friendly transportation, reducing the consumption of single-use plastics, and implementing sustainable consumption patterns. The second pillar, adaptation, emphasizes increasing the ability of individuals and communities to face climate disasters. Examples are through knowledge of flood evacuation, food security strategies during a long drought, clean water management, and risk management of public health that is vulnerable to climate change. Meanwhile, the third pillar, namely understanding and awareness, emphasizes the importance of science-based climate literacy combined with critical and analytical thinking skills, as well as the ability to make the right decisions in situations full of uncertainty.

Various international studies show the effectiveness of climate change education in increasing students' literacy and awareness. For example, Nilholm et al. (2021) found that socio-scientific issues-based learning was proven to be able to increase students' understanding of the impacts of climate change while motivating them to take real action in their respective environments. The results of this study

emphasize that the connection between scientific issues and social context makes learning more meaningful and has a long-term impact. In the context of developing countries, importance of community-based education. Through this approach, students not only learn theoretically in the classroom but can also directly see the connection between climate change and daily life, such as damage to agriculture due to drought or floods that disrupt community activities.

However, in Indonesia, research on the effectiveness of climate change education is still relatively limited. Most of the school curriculum is still too focused on the cognitive aspect which emphasizes memorizing concepts, while the affective and psychomotor dimensions related to attitudes and real actions have not been fully touched. Teachers also often face difficulties in linking climate change issues with existing learning materials, either due to limited resources, minimal contextual teaching materials, or a lack of training related to climate pedagogy. This is a serious obstacle in encouraging comprehensive and applicable climate education. Even so, there are a number of positive initiatives that deserve appreciation. The *adiwiyata* school program, for example, provides a space for students to learn directly about waste management, water conservation, school greening, and the application of an environmentally friendly culture in daily activities.

In addition, project-based environmental education has also begun to be implemented in several schools, allowing students to conduct small research or real actions related to sustainability. By strengthening climate change education, Indonesia not only increases students' awareness about the importance of sustainability, but also builds a generation that is more resilient and ready to face

various climate impacts. This is in line with global efforts to achieve the SDGs targets, especially goal 13 on climate action, which is highly dependent on the literacy, participation, and awareness of the young generation. Climate change education that is integrated with the curriculum, supported by competent teachers, and equipped with adequate facilities and resources will be key in forming a more adaptive, resilient, and responsible society toward the sustainability of planet earth.

5. Conclusion

This research confirms that education plays a central role in supporting the achievement of the Sustainable Development Goals (SDGs), especially through the concepts of Education for Sustainable Development (ESD) and climate change education. Quality education not only functions to increase individual capacity but also becomes a transformative instrument in social, economic, and environmental development. Education for Sustainable Development allows for cross-curricular integration that emphasizes the connection between science, social, and humanities values. This approach encourages students to have critical literacy as well as awareness of sustainability issues. Meanwhile, climate change education plays an important role as an adaptation and mitigation strategy needed by Indonesia as a country with a high level of vulnerability to climate impacts.

However, implementation in Indonesia still faces a number of challenges, such as the gap between policy and reality in schools, limited resources, and minimal research on the effectiveness of climate education. Therefore, strengthening education policy, teacher training, providing a climate-based curriculum, and

community involvement in the learning process are needed. This research shows that sustainability-based education is not just a means of knowledge transfer, but a social transformation instrument that can accelerate the achievement of the SDGs. By strengthening climate change education and ESD, Indonesia has a great opportunity to build a resilient generation that is ready to face global challenges while maintaining the sustainability of life in the future.

References

- Annan-Diab, F., & Molinari, C. (2017). Interdisciplinarity: Practical approach to advancing education for sustainability and for the Sustainable Development Goals. *The International Journal of Management Education*, 15(2), 73-83.
- Avelar, A. B. A., da Silva-Oliveira, K. D., & da Silva Pereira, R. (2019). Education for advancing the implementation of the Sustainable Development Goals: A systematic approach. *The international journal of management education*, 17(3), 100322.
- Braßler, M., & Sprenger, S. (2021). Fostering sustainability knowledge, attitudes, and behaviours through a tutor-supported interdisciplinary course in education for sustainable development. *Sustainability*, 13(6), 3494.
- de Looze, M., Elgar, F. J., Currie, C., Kolip, P., & Stevens, G. W. (2019). Gender inequality and sex differences in physical fighting, physical activity, and injury among adolescents across 36 countries. *Journal of Adolescent Health*, 64(5), 657-663.

- Feinstein, N. W., & Mach, K. J. (2020). Three roles for education in climate change adaptation. *Climate policy*, 20(3), 317-322.
- Ferguson, T., Roofe, C., & Cook, L. D. (2021). Teachers' perspectives on sustainable development: the implications for education for sustainable development. *Environmental Education Research*, 27(9), 1343-1359.
- García, M. C. F., De Nicolás, V. L. D. N., Blanco, J. L. Y., & Fernández, J. L. (2021). Semantic network analysis of sustainable development goals to quantitatively measure their interactions. *Environmental Development*, 37, 100589.
- Haridza, R., & Irving, K. E. (2017). The evolution of Indonesian and American science education curriculum: A comparison study. *Educare*, 9(2).
- Ke, L., Sadler, T. D., Zangori, L., & Friedrichsen, P. J. (2021). Developing and using multiple models to promote scientific literacy in the context of socio-scientific issues. *Science & Education*, 30(3), 589-607.
- Lai, C., Huang, Y. X., & Lam, T. (2020). Teachers' socio-spatial practice in innovative learning environments. *Cambridge Journal of Education*, 50(4), 521-538.
- Molthan-Hill, P., Worsfold, N., Nagy, G. J., Leal Filho, W., & Mifsud, M. (2019). Climate change education for universities: A conceptual framework from an international study. *Journal of Cleaner Production*, 226, 1092-1101.
- Nilholm, C., Sundberg, D., Forsberg, E., Hirsh, Å., & Román, H. (2021). The aims and meaning of teaching as reflected in high-impact reviews of teaching research. *Teaching and Teacher Education*, 107, 103488.

- Shin, M. H. (2018). Effects of Project-Based Learning on Students' Motivation and Self-Efficacy. *English teaching*, 73(1), 95-114.
- Unterhalter, E. (2019). The many meanings of quality education: Politics of targets and indicators in SDG 4. *Global Policy*, 10, 39-51.