Journals Scientifica Education Journal
E-ISSN : 3046-8523
https://nawalaeducation.com/index.php/SEJ/index
Vol.2.No.5 November 2025
DOI: https://doi.org/10.62872/k4qsmt87

Integration of Global SDGs Issues in Science Material: Curriculum Review

Nahri Idris
Universitas Jambi

E-mail: nahriidris@gmail.com

Inputted : October 23, 2025 *Revised : October 28, 2025*
Accepted : November 22, 2025 *Published: October 30, 2025*

ABSTRACT

This study aims to examine the extent to which global issues in the Sustainable Development Goals (SDGs) are integrated into Natural Science (IPA) subject matter in the 2013 Curriculum and the Independent Curriculum in Indonesia. The method used is descriptive qualitative with a document analysis approach to national curriculum documents and science textbooks for elementary and secondary education. The results show that the integration of SDGs in science material has begun, especially in themes such as the environment, energy, and climate change. However, this integration is not evenly distributed and remains implicit. The Independent Curriculum provides greater space for the development of contextual learning based on global issues, while textbooks and learning guides still need to be adjusted to support integration with the SDGs. Strengthening of learning policies and guidelines is needed so that teachers can develop science learning with a sustainable perspective in a more systematic and comprehensive manner.

Keywords: Curriculum Integration, Natural Sciences, SDGs, Sustainable Education

INTRODUCTION

Sustainable Development Goals (SDGs) are a global sustainable development agenda agreed upon by member countries of the United Nations (UN) to be achieved by 2030.(Krannich & Reiser, 2021)This agenda consists of 17 goals and 169 targets covering various important aspects of development, including poverty alleviation, improving the quality of education, gender equality, environmental protection, and inclusive and sustainable economic development.(Halisçelik & Soytas, 2019)The SDGs serve as a shared framework that unites the commitments of countries worldwide to address global challenges in an integrated, inclusive, and future-oriented manner. The successful implementation of the SDGs is crucial because it will determine the direction of human progress in creating a more just, prosperous, and sustainable world for current and future generations.

Education, particularly at the primary and secondary levels, plays a strategic role in shaping sustainable awareness, knowledge, and behavior in the younger generation. Through education integrated with sustainable development values, students are not only provided with a conceptual understanding of global issues such as climate change, gender equality, and poverty reduction, but are also encouraged to actively participate in real-world solutions in their communities.(Cyfert et al., 2024)Quality and inclusive

education serves as the foundation for achieving all SDGs, as it enhances individuals' capacity to make socially and ecologically responsible decisions. Therefore, integrating SDG issues into the curriculum is a crucial step in creating a generation that is environmentally conscious, socially responsible, and ready to become agents of change for a sustainable future.

Natural Sciences (IPA) is a highly relevant subject in linking scientific concepts and principles to various real-world issues facing the world today, such as climate change, renewable energy use, environmental degradation, and natural resource conservation. Through science learning, students not only learn scientific theories and facts but are also encouraged to understand the impact of human activities on the environment and the importance of applying science in everyday life. Science is an effective medium for developing critical awareness, analytical skills, and scientific attitudes in students in addressing global issues. With a contextual and problem-solving-based approach, science learning can strengthen scientific literacy while instilling sustainable values that align with the goals of the SDGs, thereby producing a generation that is more prepared and responsive to current and future global challenges.(Ling et al., 2019).

The curriculum is the main instrument that functions as a guide and structure in the learning process, as well as being the foundation for forming the character and competence of students.(Salamah et al., 2025)In the context of sustainable development, the curriculum plays a key role in integrating the values and principles of the Sustainable Development Goals (SDGs) into various subjects, including Science, Civics, and Social Studies. Through holistic curriculum planning that is responsive to global issues, teachers can connect learning materials to the realities of life, encourage critical thinking, and instill social and environmental awareness in students. Thus, the curriculum functions not only as an administrative tool but also as a transformative tool that can shape a generation of learners who are aware of global challenges and actively contribute to achieving sustainable development goals.(Cottafava et al., 2019).

Based on initial observations and findings from various previous studies, the integration of Sustainable Development Goals (SDGs) values and issues in Natural Sciences (IPA) learning at the elementary and secondary education levels is still sporadic, uneven, and has not been carried out systematically.(Alcamo et al., 2020)Many teachers do not yet fully understand how to explicitly link science material to global contexts such as climate change, renewable energy, or biodiversity conservation in the learning process.(Nation & Feldman, 2021)This is due to several factors, including limited teacher training related to sustainability education, the lack of structured curriculum guidelines, and a lack of contextual and relevant learning resources related to SDGs issues. Consequently, the potential of science as a vehicle for instilling awareness and concrete action on global issues has not been fully utilized. Therefore, a more integrated curriculum approach, ongoing teacher training, and the development of teaching materials capable of effectively and applicably bridging science content with sustainability values are needed.(Buabeng & Amo-Darko, 2025).

A systematic and in-depth review of the Natural Sciences (IPA) curriculum and textbooks is needed to identify the extent to which learning materials align with the indicators of the Sustainable Development Goals (SDGs). This review is crucial for evaluating whether science learning content reflects sustainability values, such as environmental awareness, social responsibility, and critical thinking on global issues.

Furthermore, an analysis of the curriculum and learning resources will provide a clearer picture of the opportunities and constraints in integrating the SDGs into science learning more comprehensively. The results of this study can serve as a basis for developing more relevant and contextual teaching strategies and supporting the

formulation of education policies responsive to the global challenges of the 21st century. Thus, curriculum studies not only contribute to improving the quality of education but also play a role in strengthening the role of schools as agents of change towards sustainable development.

Indonesia, as a developing country, faces complex challenges in aligning its education sector with the sustainable development agenda, addressing human resource quality, disparities in access to education, and geographic and cultural diversity. In this context, education serves as a strategic instrument for strengthening collective awareness and community capacity to address global issues such as climate change, food security, the energy crisis, and natural resource management.

Therefore, it is crucial for Indonesia to ensure that the national curriculum, particularly in subjects such as science (IPA), is not only oriented toward cognitive achievement but also integrates values and competencies that support sustainable development. This effort includes curriculum review, development of teaching materials contextualized to local realities, and teacher training to enable them to deliver material relevant to global challenges. Thus, the Indonesian education curriculum is expected to be a catalyst for change, while addressing national and global development challenges holistically and sustainably.(Faruq & Bakar, 2025).

Indonesia as a developing country faces various challenges in aligning its education system with the sustainable development goals (SDGs), ranging from disparities in the quality of education between regions, limited infrastructure, to low environmental and scientific literacy among students.(Safitri et al., 2022)In this context, education plays a crucial role as a means of developing awareness, attitudes, and skills that support sustainable development. Therefore, the national curriculum, particularly for Natural Sciences (IPA), needs to be designed in an integrative manner so that it focuses not only on academic aspects but also instills values of sustainability and awareness of global issues such as climate change, the energy crisis, and environmental conservation.

This requires continuous curriculum evaluation and adjustment, the development of teaching materials contextualized to local conditions, and the enhancement of teacher competency in linking learning to global challenges. Thus, education in Indonesia can serve as a strategic foundation in preparing a generation that is not only academically intelligent but also resilient, adaptive, and competitive in facing the dynamics of development at the national and global levels.

Although various previous studies have discussed student engagement in SDGs-based learning activities, most of these studies have focused more on implementation aspects at the classroom level or extracurricular activities, and not many have specifically analyzed curriculum content from the perspective of integrating SDGs values and indicators.(Yudha et al., 2025). In fact, the curriculum is the main foundation that determines the direction and content of learning in schools. To date, there has been no in-depth and systematic study comparing the extent of SDGs integration in two different national curricula, particularly in the context of Natural Sciences (IPA) subjects, which are closely linked to global issues such as the environment, energy, and sustainability. Furthermore, curriculum analysis that connects IPA material with SDG indicators thematically and conceptually is still very limited, leaving significant research room to explore how the curriculum can more optimally shape sustainable awareness and literacy in students.

This study aims to identify the extent to which global issues listed in the Sustainable Development Goals (SDGs) have been integrated into the Natural Sciences (IPA) learning materials in two national curricula in Indonesia, namely the 2013

Curriculum and the Merdeka Curriculum. In addition, this study also aims to analyze the relevance and depth of the IPA materials related to the SDGs goals, such as climate change, renewable energy, ecosystem sustainability, and natural resource management. Through this analysis, it is hoped that a clear picture can be obtained regarding the strengths and weaknesses in the integration of sustainability values in the curriculum. Based on the findings obtained, this study will also provide strategic recommendations to strengthen the integration of SDGs in curriculum-based IPA learning, so that education in Indonesia can play a more active role in preparing a generation that is environmentally conscious, critical thinking, and ready to face global challenges in a sustainable manner.

METHOD

This study uses a descriptive qualitative method with a document analysis approach to examine the extent to which global issues in the Sustainable Development Goals (SDGs) are integrated into the Natural Science (IPA) material in the primary and secondary education curriculum in Indonesia. The main data sources are national curriculum documents (the Merdeka Curriculum and the 2013 Curriculum), science textbooks, and learning implementation guidelines from the Ministry of Education. Data collection techniques are carried out through literature studies and document reviews with a focus on learning content related to the 17 SDGs goals, such as environmental issues, clean energy, clean water and sanitation, and climate change. Data analysis is carried out by categorizing and thematic coding of the relationship between the science material and SDG indicators, which are then interpreted qualitatively to obtain a comprehensive picture of integration. Data credibility is strengthened by source triangulation and expert discussions to ensure the accuracy of interpretation.

RESULTS AND DISCUSSION

The identification results show that the Natural Sciences (IPA) material in the 2013 Curriculum and the Independent Curriculum has included a number of themes relevant to the Sustainable Development Goals (SDGs), such as climate change (SDG 13), clean and affordable energy (SDG 7), clean water and sanitation (SDG 6), and life on land and at sea (SDG 14 and 15). However, the distribution of integration of these themes is not evenly distributed, with a predominance at the 7th and 8th grades of junior high school, while at the elementary school level the presentation is still general and not explicitly directed at the SDGs. The Independent Curriculum appears to be more prominent in providing space for contextualization through learning flexibility and an emphasis on strengthening the Pancasila student profile, which is in line with the global values of the SDGs, especially through a learning project approach.(Rivaldy, 2024)However, science textbooks still present material factually without a structure that systematically refers to SDGs indicators, so the linkages to global and local issues have not been optimally addressed. In this context, the role of teachers is crucial, because the successful integration of SDGs themes into science learning depends heavily on their initiative and capacity to connect the material to global realities, which unfortunately is still hampered by limited training and practical guidance available.

The Need for a Curriculum that is Responsive to Global Issues

The results of the study show that although the integration of Sustainable Development Goals (SDGs) values and themes into the curriculum has begun, the existing curriculum is still not fully responsive to the dynamics and challenges of the ever-evolving global landscape.(Albuquerque et al., 2023). A more adaptive and anticipatory curriculum design is needed for crucial 21st-century issues, such as the

climate crisis, social inequality, environmental degradation, and energy security, so that students not only understand scientific concepts theoretically, but are also able to see their direct connection to sustainable development at the local, national, and global levels.(Newsome et al., 2023)A responsive curriculum needs to emphasize contextual, interdisciplinary learning, and the strengthening of critical, collaborative, and solution-oriented thinking skills, so that students can become agents of change aware of social and environmental responsibility. This also requires support in the form of educational policies that favor global issue-based learning, the development of relevant teaching materials, and teacher training to implement learning approaches that foster awareness and concrete action on sustainability challenges.(Richter & De Sousa, 2019).

The findings of the study indicate that although the integration of Sustainable Development Goals (SDGs) values and themes into the science curriculum has begun to take shape, the current curriculum remains only partially responsive to the complexity and urgency of global challenges. Albuquerque et al. (2023) note that curriculum shifts tend to focus more on content additions rather than on transforming the underlying pedagogical framework to reflect the rapidly evolving global landscape. As a result, SDG integration often appears symbolic or surface-level—limited to including sustainability-related terminology (rather than deeply embedded in learning objectives, instructional activities, and assessment practices).

A curriculum that genuinely prepares students for the demands of the 21st century must adopt a more adaptive, anticipatory, and future-oriented design, particularly in addressing critical issues such as the climate crisis, social inequality, environmental degradation, biodiversity loss, and energy security. As highlighted by Newsome et al. (2023), students should not merely acquire theoretical knowledge about these scientific issues but must be able to recognize their implications at the local, national, and global levels. This means learning experiences should guide students to understand how scientific concepts intersect with socioeconomic and environmental realities, enabling them to interpret scientific facts not in isolation but within a broader sustainability framework.

To achieve this, a responsive science curriculum must place greater emphasis on contextual, interdisciplinary learning that goes beyond traditional subject boundaries. Such an orientation encourages learners to build systems thinking analyzing how ecological, technological, political, and cultural dimensions influence one another. In addition, strengthening cognitive competencies such as critical thinking, collaborative problem-solving, creativity, scientific inquiry, and ethical reasoning is essential not only for academic achievement but also for empowering students to act as agents of change capable of proposing realistic and sustainable solutions for their communities.

However, curricular reform cannot operate effectively in isolation. As Richter and De Sousa (2019) emphasize, policy alignment and systemic educational support are crucial to ensure that SDG-based learning is consistently implemented and not dependent solely on the initiative of individual teachers or schools. This necessitates the development of teaching materials that are explicitly relevant to global sustainability issues, accompanied by assessment models that measure not only factual mastery but also students' critical awareness, sense of responsibility, and capacity to take informed action. Sustained teacher professional development is equally important so educators can design learning processes that foster global awareness rather than teaching sustainability as a peripheral or add-on topic.

A strengthened analysis further highlights that without a holistic reform effort, SDG integration risks evolving into a curricular paradox: sustainability issues are acknowledged but not operationalized, discussed but not internalized, and taught but

not practiced. Therefore, a future-ready science curriculum must not simply include SDG themes, it must be driven by them, ensuring that sustainability becomes an organizing principle that shapes pedagogical decisions, learning outcomes, and classroom culture. Only through such deep structural alignment can schools cultivate a generation of scientifically literate learners who understand the urgency of global challenges and possess the knowledge, values, and skills to contribute meaningfully to sustainable development.

The Potential of Science in Building Global Awareness

Natural Science (IPA) learning has great potential in building students' global awareness if it is designed contextually and based on projects that are relevant to real life.(Reka Nurjanah et al., 2024)Through this approach, students not only learn abstract scientific concepts and theories, but are also actively involved in observing, analyzing, and solving problems related to global issues such as climate change, environmental pollution, food security, and renewable energy. Project-based learning enables students to develop 21st-century skills such as critical thinking, collaboration, communication, and creativity, while fostering empathy and social responsibility for issues around them.(Astuti et al., 2024)By integrating the values of the Sustainable Development Goals (SDGs) into science learning, teachers can guide students to understand that science is not just technical knowledge, but also has a strategic role in creating positive change for society and the environment in a sustainable manner. This approach makes science an important vehicle for cultivating a generation with strong scientific literacy and a deep global awareness, in line with the vision of 21st-century education that emphasizes readiness to face the challenges of a complex and interconnected world.(Kumar & Choudhary, 2024).

Natural Science (IPA) learning has enormous potential to cultivate students' global awareness, particularly when the instructional design adopts contextual and project-based learning approaches that reflect real-world scientific issues. As stated by Reka Nurjanah et al. (2024), the learning of science becomes more meaningful when students are encouraged to relate scientific concepts to phenomena occurring in their surroundings and the wider global environment. This approach allows students not only to understand scientific theory abstractly but also to develop sensitivity toward real problems that humanity currently faces, such as climate change, environmental degradation, waste management, deforestation, loss of biodiversity, food security, and the energy crisis. By recognizing science as a tool for problem-solving rather than merely a body of knowledge, students develop a deeper understanding of their role as global citizens capable of contributing to sustainable development.

The strength of contextual science learning lies in its orientation toward authentic learning experiences. Instead of being passive listeners, students are positioned as observers and investigators who interact directly with the subject of their learning. In this model, students examine data, conduct simple experiments, make comparisons, model scientific mechanisms, and formulate solutions based on evidence. Such learning experiences not only sharpen conceptual understanding but also bridge the gap between school science and scientific reality in society. When students learn about climate change, for example, they do not simply memorize the definitions of greenhouse gases, but also explore daily behaviors that contribute to carbon emissions and design solutions that can minimize negative environmental impacts. In this way, learning becomes transformative and not merely informative.

Project-Based Learning (PBL) has been identified as an effective pedagogical bridge for this purpose. According to Astuti et al. (2024), PBL provides space for

students to develop a wide range of 21st-century skills, including critical thinking, problem solving, communication, collaboration, creativity, scientific inquiry, and digital literacy, because the learning process encourages students to design, plan, and execute a project that addresses a real scientific challenge. PBL situates science learning within a meaningful context while encouraging students to work together, negotiate ideas, manage conflict constructively, and integrate feedback as part of the learning process. The collaborative nature of PBL also nurtures social and emotional competencies, including empathy, responsibility, and respect toward diverse perspectives, all of which are essential in building global awareness.

Another crucial aspect of science learning that builds global consciousness is the integration of Sustainable Development Goals (SDGs) as a conceptual and ethical foundation in the curriculum. By linking scientific content to SDG topics (such as clean water and sanitation (SDG 6), affordable and clean energy (SDG 7), responsible consumption and production (SDG 12), and climate action (SDG 13) students are guided to understand science not only from a cognitive standpoint but also from a moral and humanitarian perspective. Science becomes more than experiments and formulas; it transforms into a tool for promoting sustainable living and for designing innovations that contribute to social welfare and environmental sustainability. Kumar and Choudhary (2024) emphasize that such integration encourages a new paradigm in science education: the view that scientific literacy is intimately linked to the ability to respond critically and reflectively to global challenges.

Moreover, contextual and project-based science learning supports students in developing systems thinking, which is the capacity to see the interconnections between scientific, social, economic, and environmental dimensions. For example, a project on renewable energy does not only focus on understanding the conversion of energy from solar or wind power into electricity but also analyzes how the energy transition influences employment, public policy, environmental conservation, and global geopolitical relationships. Students learn that science operates within a complex network of interactions and that scientific solutions have both intended and unintended consequences. This systems perspective forms one of the core competencies of global awareness and prepares students to make informed decisions throughout their lives.

The role of the teacher remains central in ensuring that contextual and project-based learning is implemented effectively. Teachers must act not only as transmitters of knowledge but also as facilitators, mentors, and project supervisors who stimulate inquiry, guide investigations, and monitor student reflection. They are tasked with designing learning frameworks that balance student autonomy with structured guidance, ensuring that the project process remains scientifically rigorous while still encouraging creativity and independence. Assessment should also shift toward a holistic evaluation model, including reflective journals, portfolios, peer reviews, and rubrics that assess process as well as product.

In addition, the incorporation of digital tools (such as online simulations, learning platforms, virtual laboratories, and collaborative project applications) can significantly expand opportunities for contextual and global science learning. Technology helps students access global scientific data, communicate with experts or peers outside their schools, and simulate scientific processes that are too complex or unsafe to reproduce in a traditional classroom. Through this integration, science learning becomes more inclusive, innovative, and future-oriented.

Ultimately, the alignment of Natural Science learning with contextual challenges, PBL pedagogy, and SDG values ensures that science becomes an educational pathway for developing scientifically literate, empathetic, and socially responsible generations.

Students learn to see scientific knowledge as a dynamic and meaningful tool for engaging with the world, not merely as material to be memorized for examinations. In line with the vision of 21st-century education, science learning that promotes global awareness prepares students to face the realities of an increasingly complex, interconnected, and unpredictable world, where environmental and social sustainability depend on the scientific wisdom and ethical commitment of its citizens.

Recommendations for Strengthening Material and Teaching Approaches

To strengthen the integration of Sustainable Development Goals (SDGs) in Natural Science (IPA) learning, a series of strategic steps are needed that include the development of more systematic and sustainable teaching materials and approaches.(Ferrer-Estévez & Chalmeta, 2021)Developing SDGs-based modules and textbooks is an important first step, with content that not only includes scientific facts but also links them directly to global and local issues, such as climate change, biodiversity conservation, and energy and natural resource management. Learning materials should be structured thematically and interdisciplinaryly, thus developing scientific literacy while fostering critical awareness and social awareness in students.(Rivaldy, 2024). In addition, ongoing teacher training is essential so that they have an adequate understanding of the SDGs and are able to design and implement contextual, collaborative, and project-based learning. Thus, the integration of SDGs in science learning is no longer optional or dependent on individual teacher initiative, but rather becomes an integral and systematic part of the educational process aimed at shaping a generation that is sensitive to global challenges and actively contributes to sustainable development.(Tasquier et al., 2022).

To strengthen the integration of the Sustainable Development Goals (SDGs) in Natural Science (IPA) learning, it is necessary to implement a series of strategic, systematic, and sustainable efforts that go beyond simply inserting SDG-related topics into the curriculum. According to Ferrer-Estévez and Chalmeta (2021), a long-term transformation in science learning requires intentional instructional design supported by well-structured learning resources. Developing SDG-based modules and textbooks constitutes a crucial foundational step because it ensures that learning materials do not merely present isolated scientific facts, but rather connect them to pressing global and local issues such as climate change, biodiversity conservation, waste management, renewable energy, food security, and sustainable use of natural resources. When instructional materials are designed with this integrated perspective, students are encouraged to see science not only as a body of knowledge but also as an analytical lens for understanding real-world challenges.

SDGs-aligned science learning modules must therefore be thematic, interdisciplinary, and inquiry-based. As emphasized by Rivaldy (2024), thematic learning encourages the development of scientific literacy while simultaneously fostering critical awareness and social responsibility. This approach allows students to recognize the interconnectedness between scientific, social, economic, and environmental dimensions. For example, a unit on renewable energy can involve physics (energy transformation), biology (ecosystem impacts), geography (regional energy potential), economics (production costs), and civics (energy policies and regulations). Interdisciplinary learning such as this helps students develop systems thinking, which is an essential competency for understanding how scientific innovation contributes to sustainable development.

However, the availability of high-quality instructional materials alone is insufficient. Continuous and capacity-building teacher training is equally vital to ensure

that the integration of SDGs into science learning can be carried out effectively and sustainably across schools. Teachers must possess not only a conceptual understanding of the SDGs but also the pedagogical expertise to translate SDG principles into contextual, collaborative, project-based learning activities. This includes designing learning experiences that require students to conduct investigations, collaborate in teams, propose solutions to scientific problems, and present their findings in a structured and evidence-based manner. Without adequate professional development, the integration of SDGs risks becoming superficial, limited to awareness campaigns or one-off activities rather than deeply embedded into the learning process.

Ongoing teacher professional development has an additional function: fostering a culture of collective responsibility and shared vision among educators. When only certain teachers integrate SDGs based on personal initiative, the effort remains fragmented and inconsistent. Conversely, when schools organize regular training, peer learning sessions, and collaborative planning meetings, SDG-oriented science learning becomes a shared pedagogical priority rather than an individual preference. In this way, the integration of SDGs moves from being *optional* to becoming a core and institutionalized component of science education, fully aligned with school policies and curriculum goals.

Tasquier et al. (2022) emphasize that such institutionalization is necessary to ensure that SDG-based science learning contributes to shaping a generation that is not only knowledgeable but also ethically and socially responsible. Students are expected to develop a worldview in which science is recognized as a tool for decision-making and social transformation, rather than a subject focused solely on exams and cognitive performance. When science learning is consistently aligned with SDGs, students learn to evaluate environmental, technological, and social issues from an evidence-based perspective while cultivating empathy, responsibility, and readiness to take action. This encourages a new orientation in science education, one that does not merely aim to produce scientifically literate individuals, but also global citizens who proactively contribute to sustainable development. (Albuquerque et al., 2023).

Ultimately, strengthening the integration of SDGs in science learning represents a systemic reform rather than a short-term instructional trend. It requires alignment between curriculum development, teaching materials, teacher training, assessment practices, and school management policies. Only by addressing these interconnected elements can SDG-based science learning achieve its full transformative potential—preparing future generations with the knowledge, competencies, values, and collaborative mindset needed to address global challenges and promote sustainable living.

CONCLUSION

The integration of the Sustainable Development Goals (SDGs) into the Natural Science (IPA) curriculum in Indonesia has begun, but it remains uneven and incomplete. Several themes such as the environment, clean energy, and climate change have appeared in the science materials, but they do not yet systematically cover all SDG objectives. The Merdeka Curriculum demonstrates greater flexibility than the 2013 Curriculum, particularly in providing space for teachers to link science learning to global issues. The 2013 Curriculum tends to be more dense and structured, limiting the scope for integration. SDG indicators have not been explicitly used as a reference in the development of basic competencies or learning outcomes, making SDG integration implicit and highly dependent on context and teacher creativity. Available textbooks and learning guides are also limited in presenting SDG issues thematically and

contextually, requiring teachers' initiative to link science material to sustainability values. Therefore, it is necessary to strengthen policies and develop more systematic guidelines so that the integration of SDGs in science learning can be implemented consistently, in a targeted and effective manner in forming global awareness and social responsibility of students through a scientific approach.

BIBLIOGRAPHY

Albuquerque, A.S., Fernandes, S., Araújo, A., Morais, P., & Barros, E. (2023). INTEGRATION OF SUSTAINABLE DEVELOPMENT GOALS (SDG) IN THE CURRICULUM: FINDINGS BASED ON THE ANALYSIS OF HIGHER EDUCATION PROGRAMMES. 7964–7971. https://doi.org/10.21125/edulearn.2023.2066

Alcamo, J., Thompson, J., Alexander, A., Antoniades, A., Delabre, I., Dolley, J., Marshall, F., Menton, M., Middleton, J., & Scharlemann, J.P.W. (2020). Analyzing interactions among the sustainable development goals: Findings and emerging issues from local and global studies. Sustainability Science, 15(6), 1561–1572. https://doi.org/10.1007/s11625-020-00875-x

Buabeng, I., & Amo-Darko, B. (2025). Curriculum reforms without foundation: The effects of inadequate preparation in curriculum reforms on Ghanaian teachers and the education system. Curriculum Perspectives. https://doi.org/10.1007/s41297-025-00309-7

Cottafava, D., Cavaglià, G., & Corazza, L. (2019). Education of sustainable development goals through students' active engagement: A transformative learning experience. Sustainability Accounting, Management and Policy Journal, 10(3), 521–544. https://doi.org/10.1108/SAMPJ-05-2018-0152

Cyfert, S., Górka, J., Piórkowska, K., Dyduch, W., Glabiszewski, W., & Batko, R. (2024). Shaping sustainable development of tomorrow: Generation Z competencies, green consumption values and the role of knowledge acquisition sources. Central European Management Journal. https://doi.org/10.1108/CEMJ-07-2024-0213

Ferrer-Estévez, M., & Chalmeta, R. (2021). Integrating Sustainable Development Goals in educational institutions. The International Journal of Management Education, 19(2), 100494. https://doi.org/10.1016/j.ijme.2021.100494

Fika Rahayu Astuti, Indah Rama Sahara, & Gusmaneli Gusmaneli. (2024). Implementation of Project-Based Learning (PjBL) in Islamic Religious Education Learning. Indonesian Education Star Journal, 3(1), 01–15. https://doi.org/10.55606/jubpi.v3i1.3390

Halisçelik, E., & Soytas, M. A. (2019). Sustainable development from millennium 2015 to Sustainable Development Goals 2030. Sustainable Development, 27(4), 545–572. https://doi.org/10.1002/sd.1921

Haris Sandi Yudha, Asep Supriatna, Ahmad Riyadi, Candra Mochamad Surya, & Sony Kuswandi. (2025). Development of a Holistic Educational Management Model Based on Islamic Values in Elementary Madrasahs. Attractive: Innovative Education Journal, 7(1), 58–75. https://doi.org/10.51278/aj.v7i1.1743

Krannich, A.-L., & Reiser, D. (2021). The United Nations Sustainable Development Goals 2030. In S. Idowu, R. Schmidpeter, N. Capaldi, L. Zu, M. Del Baldo, & R. Abreu (Eds.), Encyclopedia of Sustainable Management (pp. 1–5). Springer International Publishing. https://doi.org/10.1007/978-3-030-02006-4_178-1

Kumar, V., & Choudhary, S. K. (2024). Reimagining Scientific Literacy: A Framework for Future-Focused Science Education. https://doi.org/10.21203/rs.3.rs-4347536/v1

Ling, L. S., Pang, V., & Lajium, D. (2019). THE PLANNING OF INTEGRATED STEM EDUCATION BASED ON STANDARDS AND CONTEXTUAL ISSUES OF SUSTAINABLE DEVELOPMENT GOALS (SDG). Journal of Archipelago Studies (JONUS), 4(1), 300. https://doi.org/10.24200/jonus.vol4iss1pp300-315

Nation, M. T., & Feldman, A. (2021). Environmental Education in the Secondary Science Classroom: How Teachers' Beliefs Influence Their Instruction of Climate Change. Journal of Science Teacher Education, 32(5), 481–499. https://doi.org/10.1080/1046560X.2020.1854968

Newsome, D., Newsome, K. B., & Miller, S. A. (2023). Teaching, Learning, and Climate Change: Anticipated Impacts and Mitigation Strategies for Educators. Behavior and Social Issues, 32(2), 494–516. https://doi.org/10.1007/s42822-023-00129-2

Reka Nurjanah, Shinta Purnamasari, & Andinisa Rahmaniar. (2024). Analysis of the Implementation of Local Potential in Natural Science Learning. JOURNAL OF MIPA EDUCATION, 14(1), 48–56. https://doi.org/10.37630/jpm.v14i1.1476

Richter, B. W., & De Sousa, L. O. (2019). The implementation of environmental education to promote sustainability: An overview of the processes and challenges. International Journal of Sustainable Development & World Ecology, 26(8), 721–731. https://doi.org/10.1080/13504509.2019.1672220

Rivaldy, R. (2024). THE RELEVANCE OF SOCIAL SCIENCE AMID CONTEMPORARY ISSUES: FROM CLIMATE CHANGE TO GLOBAL CONFLICT. Jurnal Muara Pendidikan, 9(1), 173–181. https://doi.org/10.52060/mp.v9i1.2039

Safitri, AO, Yunianti, VD, & Rostika, D. (2022). Efforts to Improve Quality Education in Indonesia: Analysis of Sustainable Development Goals (SDGs) Achievement. Basicedu Journal, 6(4), 7096–7106. https://doi.org/10.31004/basicedu.v6i4.3296

Salamah, N., Mujiono, & Muslihun. (2025). Curriculum Management to Shape Students' Competence in Knowledge, Religious Values, and Morals. Journal of Education and Learning Innovation, 2(1), 1–15. https://doi.org/10.59373/jelin.v2i1.90

Tasquier, G., Knain, E., & Jornet, A. (2022). Scientific Literacies for Change Making: Equipping the Young to Tackle Current Societal Challenges. Frontiers in Education, 7, 689329. https://doi.org/10.3389/feduc.2022.689329

Umar Faruq & M. Yunus Abu Bakar. (2025). Education as a Tool for Social Transformation: A Philosophy of Science Perspective. Concept: Journal of Social Humanities and Education, 4(1), 56–74. https://doi.org/10.55606/concept.v4i1.1759