

## The importance of green education in primary, secondary and higher education: A review

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Received: 10 November 2023; Revised: 19 December 2023; Accepted: 31 December 2023

**Abstract:** This review aimed to provide an understanding of the importance of implementing green education in primary, secondary, and higher education. Green education is important in primary, secondary, and higher education because it promotes environmental conservation and sustainability. It integrates various disciplines and fosters ecological awareness, responsible citizenship, and sustainable practices. Green education in primary education introduces basic environmental concepts, whereas secondary education delves deeper into environmental issues and emphasizes critical thinking. Higher education provides specialized programs and courses in environmental studies, sustainability science, and green technology, equipping students with the expertise necessary to address global environmental challenges. Green education facilitates evidence-based learning, enabling individuals to make informed decisions and take action toward a more sustainable world.

**Keywords:** green education; primary; secondary; higher education; eco-conscious culture

**How to Cite:** Adnyana, I. M. D. M., Mahendra, K. A., & Raza, S. M. (2023). The importance of green education in primary, secondary and higher education: A review. *Journal of Environment and Sustainability Education*, 1(2), 42-lastpage. Retrieved from <https://joease.id/index.php/joease/article/view/14>

### Introduction

Green education emphasizes the environmental conservation or sustainability education provided to learners and is an integral component of learning that emphasizes ecological awareness, responsible citizenship, and sustainable practices (Adnyana & Sudaryati, 2022). Its importance spans primary, secondary, and higher education levels, offering a holistic understanding of environmental issues and encouraging active participation in creating a more sustainable world. Green education is essential in primary, secondary, and higher education because of its potential to shape environmentally conscious and responsible citizens. The concept of green education revolves around the inculcation of knowledge, skills, and values that promote environmental sustainability, ecological literacy, and conservation practices, from the introduction to the application and practice of constructivism in society (Budiyanti, Aziz, & Erihadiana, 2020; Kopnina, 2020; O'Flaherty & Liddy, 2018; Shulla, Filho, Lardjane, Sommer, & Borgemeister, 2020; Suryani et al., 2019). However, until now, the cultivation of concepts and practices at all levels of education has not been carried out extensively, and the concept of green education has not been contextually applied in the learning process. This is certainly a

predictor of low environmental awareness among students and the community, which hampers the goals of sustainable development, especially the provision of a safe, comfortable, and clean environment accompanied by inclusive education (Ribó, 2023; Scalabrino, Salvador, & Oliva Martínez, 2022; Stein, Andreotti, Suša, Ahenakew, & Čajková, 2022).

The high number of environmental problems experienced by the community, low awareness of protecting the environment, and poor control practices, including increasing climate change and various diseases originating from the environment, make it important to apply the concept of green education starting from primary, secondary, and higher education levels to foster a sense of environmental awareness, interest, and practice toward the environment (Adnyana & Sudaryati, 2022; Ahmad & Fazirah, 2019; Tambunan et al., 2023; Widiyanto et al., 2023). This review aimed to provide an understanding of the importance of implementing green education in primary, secondary, and higher education. Hopefully, this review will provide valuable information on the need for and importance of implementing green education in all educational units.

### Method

This study used a literature approach (Adnyana & Sudaryati, 2022). A literature search and screening were performed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (Adnyana, 2023; Paulus et al., 2023). The selection process is illustrated in Figure 1.

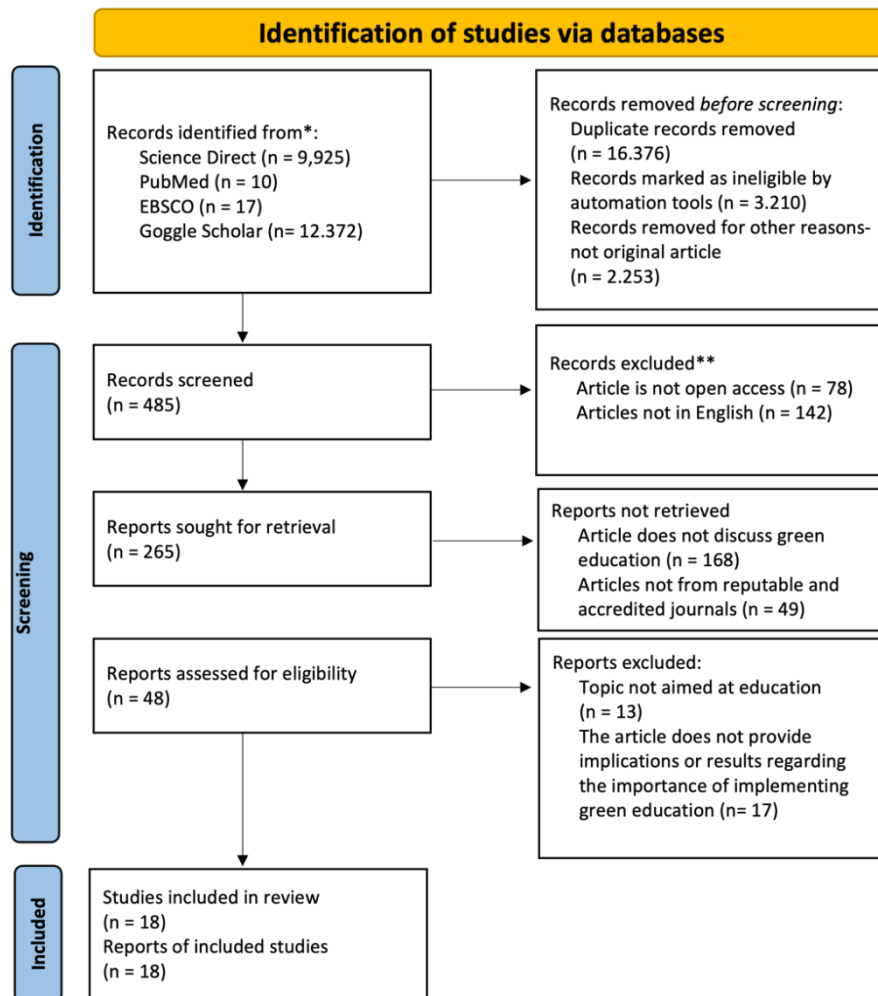


Figure 1. Flowchart of literature selection with PRISMA guidelines

This study sought to understand and examine phenomena related to the implementation of green education and environmental issues by focusing on previously published scientific literature. The

PubMed, ScienceDirect, EBSCO, and Goggle Scholar databases were used to search for articles that matched the keywords "green education," "environmental education," "implementation," "primary education," "higher education," and "secondary education." The articles included in this study were original articles; open access; discussed related research questions; published from 2004 to 2023; and came from Scopus Q1-Q4 reputable journals, Science and Technology Index (SINTA) accredited journals (S1-S6), and the Web of Science with core collection. The various research results obtained were then analyzed with regard to the application of the concept of green education at each level of education, the principles of implementing green education at each level of education, and the key aspects of implementing green education at primary, secondary, and higher education levels. All the data were descriptively analyzed and are presented in the form of short narratives

## Results and Discussion

Green education encompasses a multidisciplinary approach that integrates science, social science, ethics, and practical skills to foster understanding of environmental challenges and solutions (Gough, Lee, & Tsang, 2020). It aims to foster environmental literacy, empower individuals to understand the interdependence between humans and the environment, and encourage responsible decision-making (Ali, Rachman, & Hasim, 2021; Ardoin, Bowers, Roth, & Holthuis, 2018; Mammino 2019). Thus, it is imperative to introduce and implement learning practices that prioritize environmental conservation in the future. This can begin at various levels of education, from primary to tertiary education (Volk & Cheak, 2003).

### *The importance of green education across education levels*

In primary education, green education plays an important role in developing a strong foundation for environmental awareness. Young learners were introduced to basic concepts such as biodiversity, climate change, waste management, and renewable energy (Budiyanti et al., 2020; Dong, Zhang, Zhang, & Bi, 2023). By integrating hands-on activities, field trips, and interactive learning methods, primary education can foster curiosity about nature, encouraging children to become environmentally conscious (Ahmad & Fazirah, 2019; Tovar-Gálvez, 2021).

In secondary education, green education is built on the foundation of primary schools. It delves deeper into environmental issues and explores topics such as sustainable development, resource depletion, environmental justice, and ecological systems. Secondary education also emphasizes critical thinking and problem-solving skills, allowing students to analyze complex environmental challenges and propose innovative solutions (Moftooh & Foumani, 2021; Sholahuddin & Sadiqin, 2021). By incorporating project-based learning and community engagement, secondary education can empower students to take action and positively impact their local environments (Ballantyne, Fien, & Packer, 2001; Bruyere, 2008; Hsu, 2004; Servant-Miklos, 2022).

In higher education, green education extends the knowledge and skills acquired in the early stages. It provides specialized programs and courses that focus on environmental studies, sustainability science, and green technology. Higher education equips students with the necessary expertise to address global environmental challenges through interdisciplinary research, policy development, and sustainable business practice. By fostering a culture of innovation and collaboration, higher education institutions can produce leaders capable of addressing complex environmental issues on a global scale (Adnyana & Sudaryati, 2022; Chen, Jeronen, & Wang, 2020; Suryani et al., 2019). The importance of green education across educational levels is illustrated in Figure 2.



Figure 2. The importance of green education across education levels

### Integration of Evidence-Based Concepts in Society

Green education facilitates evidence-based learning by incorporating scientific research, empirical data, and case studies into the curriculum (Aryabkina, Kudashova, Bulynin, Aliphanova, & Silantyeva, 2021; Tovar-Gálvez, 2021). By presenting credible evidence, the students gained a deeper understanding of environmental problems and their solutions. This evidence-based approach fosters critical thinking, enabling individuals to make informed decisions and advocate evidence-based policies (Ali et al., 2021; Widiyanto et al., 2023). In addition, the integration of evidence-based green education concepts fosters a culture of environmental stewardship in which individuals value and prioritize scientific evidence when formulating policies, implementing sustainable practices, and advocating for environmental justice, including minimizing their efforts to pollute and damage the environment and turning to thinking related to the impacts caused by destroying the environment (Rosanti, Juhana, Ruswandi, & Erihadiana, 2022).

The integration of the concept of green education among the community is carried out while still in school from the elementary level to a higher level. Incorporating green education across all subjects and courses into core educational programs will have a positive impact on the sustainability of life and the environment. Providing professional development and training for educators to improve their knowledge, attitudes, and teaching skills related to green education across all sectors is necessary to effectively deliver environmentally focused content and encourage sustainable behavior among learners and communities (Stein et al., 2022; Venkataraman, 2009). The integration of green education concepts will be successful if partnerships with environmental education institutions, community organizations, environmentally focused nongovernmental organizations, and government agencies are fostered to facilitate collaborative efforts in promoting green education in theory and practice (Ardoin et al., 2020; O’Flaherty & Liddy, 2018; Saud & Ashfaq, 2022). Finally, it is important to integrate information technology into the cultivation of environmental concepts, practices, and awareness by utilizing virtual reality, augmented reality, online platforms, and mobile applications to provide interactive and immersive learning experiences related to environmental topics among learners from primary to tertiary levels (Shulla et al., 2020; Takkinen & Pulkki, 2023).

### Principles of Green Education at Different Educational Levels

The application of green principles in basic education is carried out through experiential learning, which emphasizes direct experience in nature and allows students to explore and discover the environment directly (Boca & Saraçlı, 2019). The implementation of learning by telling stories, playing,

and engaging in age-appropriate activities to convey environmental concepts fosters curiosity and empathy for the environment and protection. Educators must be able to simplify concepts by presenting environmental problems in a simple and easy-to-understand manner, thereby laying the foundation for future learning (Ahmad & Fazirah, 2019).

In secondary education, curriculum development is carried out to emphasize and encourage learners to think critically by analyzing and evaluating environmental problems; encouraging independent thinking and basic research skills related to solutions that need to be done; involving students in practical projects; encouraging them to become active participants in solving environmental problems; and providing a more comprehensive understanding of ecological systems, sustainability, and the interconnectedness of global environmental challenges (Sukma, Ramadhan, & Indriyani, 2020). Moreover, in higher education, the application of green education should emphasize and integrate various fields of study to address complex environmental problems from various perspectives; encourage advanced research, innovation, and collaboration to develop sustainable solutions; and equip students with the knowledge and skills to become leaders in advocating environmental policies and sustainable practices (Ardoin et al., 2020; Pihkala, 2020). The application of green educational principles to different levels of education is shown in Figure 3.

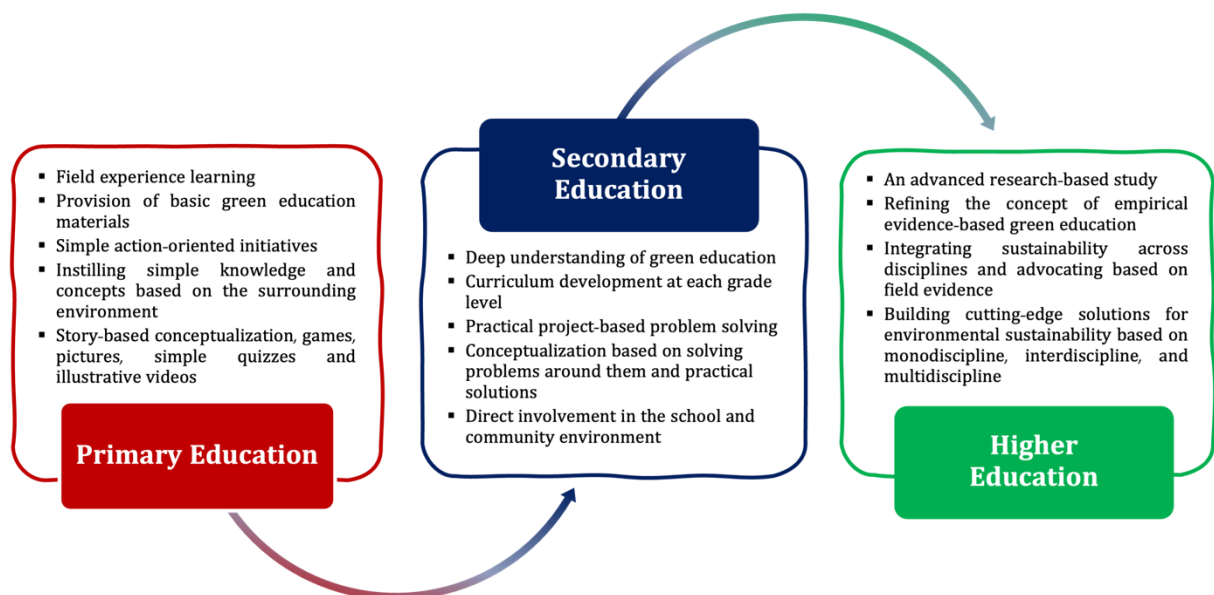


Figure 3. The application of green education principles at different levels of education

#### Key aspects of the application of green education at different education levels

The application of green education principles at the primary, secondary, and higher education levels is centered on several key aspects. First, it emphasizes experiential learning, which allows students to engage directly with natural and environmental issues. This can be achieved through field trips, outdoor activities, and practical projects that encourage hands-on learning and deeper connections with the environment. Second, green education promotes interdisciplinary learning, recognizing that environmental issues are interconnected and require a holistic approach. Collaboration among different subjects, such as science, geography, social sciences, and arts, is encouraged to provide a comprehensive understanding of environmental challenges and solutions.

Third, green education fostered a sense of environmental responsibility and citizenship. This encourages students to take ownership of their actions and make sustainable choices in daily life. By promoting values such as empathy, respect for nature, and social justice, green education instills a sense of responsibility toward protecting the environment and creating a more sustainable future (Ardoin et al., 2020; Boca & Saraçlı, 2019; Suryani et al., 2019). Finally, green education encourages community involvement and partnerships. It recognizes the importance of involving local communities,



organizations, and experts in the learning process. By collaborating with external stakeholders, students can gain practical insight, build networks, and contribute to community-based initiatives that address environmental issues.

### Conclusion

Green education is essential in primary, secondary, and higher education because it equips individuals with the knowledge, skills, and values needed to address environmental challenges. Green education can foster a generation that is knowledgeable, empowered, and committed to a sustainable future. By integrating evidence-based concepts and experiential learning, promoting an interdisciplinary approach, encouraging environmental responsibility, and fostering community involvement, green education lays the foundation for a more sustainable and environmentally conscious society and contributes to global sustainability. However, further research is needed to determine the predisposition to green education implementation at each level of education.

### Acknowledgment

The authors would like to thank PT Mega Science Indonesia for proofreading and translation of this manuscript for publication.

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