



Environmental Education and Sustainable Development: Role of Secondary School Teachers

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ABSTRACT

Environmental education is of utmost importance in empowering students to learn the knowledge, values, and skills required to solve immediate global ecological issues. The role of secondary school teachers in environmental awareness and sustainable development is the focus of this paper. Drawing on a rich conceptual framework, the paper emphasizes incorporating environmental concerns in all subjects, offering regular professional development courses for teachers and application of new pedagogical methods such as experiential learning and project work. The paper emphasizes the need to encourage school-based environmental clubs and projects and facilitation of partnership collaboration with NGOs, government agencies and local communities. These measures are emphasized as unavoidable steps to counteract factors such as inadequate teacher training, absence of teaching materials and institutional resistance. By linking educational processes with national and world sustainability goals, the study promotes strong policy measures incorporating environmental education into curriculum and instructor training programs for schools. This paper also sheds light on an integrated approach that empowers teachers and students to play proactive roles as ecological stewards and champions of sustainability.

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Introduction

Environmental education is key to transforming attitudes and behaviour towards sustainability. Teachers in secondary schools have a significant role in imparting environmental awareness and sustainable behaviour among students as the environment continues to face crises. Enhancing environmental education through school curricula, providing teachers with professional development and enhancing the quality of support institutions can potentially turn education into an effective tool for sustainable development.

Need and Importance of Environmental Education

Environmental education is a valuable instrument for the acquisition of awareness, knowledge, and skills to address environmental issues and improve sustainable behaviours. It helps individuals to better understand the intricate relationship between human actions and nature, thereby advocating for responsible behaviours resulting in ecological preservation (Tilbury, 2019). With environmental deterioration continuing to rise, e.g., deforestation, pollution, climate change, and loss of biodiversity, never has environmental awareness been more necessary (United Nations Environment Programme [UNEP], 2022).

Environmental education is not merely the transmission of environmental facts but the shaping of attitudes, values, and pro-environmental action (Gough, 2021). Including environmental education as a component of the curriculum enables the students to critically reflect on environmental issues and come up with sustainable solutions. Including aspects of waste minimization, energy conservation, climate change action, and saving biodiversity enables them to be transformative change agents for the environment (Palmer, 2020).

Secondary school educators are at the forefront of educating children in environmental awareness and stewardship. Their pedagogy, role and commitment to environmental stewardship have direct influences on the attitude and behaviour of the students towards sustainability (Mukherjee & Kumar, 2021). Training of the teachers with adequate environmental literacy and teaching materials is therefore central to the development of an environmentally conscious population.

Sustainable Development and Global Significance

Sustainable development refers to the convergence of economic development, social justice, and environmental protection in a way that the needs of the current generations are fulfilled without sacrificing the ability of the future generations to fulfil their needs (Brundtland Commission, 1987). It seeks to balance economic development with environmental sustainability and social justice to ensure long-term ecological integrity and human welfare (Sachs, 2020).



UN Sustainable Development Goals (SDGs) have a wider perspective for attaining SD. UN Goal 4 (Quality Education) and Goal 13 (Climate Action) of the 17 SDGs highlight the critical role of education in halting environmental issues and in encouraging sustainable practices (United Nations, 2015). Incorporation of environmental concerns within formal education systems is the key to developing a generation of leaders who can meet significant environmental challenges such as climate change, loss of resources and pollution (Sterling, 2021).

At a global level, climate change is a major threat to economic stability, public health, and food security. It is reported by the Intergovernmental Panel on Climate Change that the earth has heated by approximately 1.1°C above pre-industrial levels, with increasing extreme weather events (IPCC, 2021). These can be managed through a fundamental shift in the attitude and behaviour of society, which can be achieved through appropriate education and awareness-raising. Schools are appropriate institutions for the teaching of sustainability, and making students live a sustainable lifestyle (Leal Filho et al., 2020).

The Role of Education in Fostering Sustainability

It is well documented that education serves as a catalyst to sustainable development through the passing on of people with values, competencies, and skills to enable the creation of a sustainable future. UNESCO has promoted the integration of Education for Sustainable Development (ESD) into the curriculum in all levels of education to improve critical thinking, problem-solving, and decision-making capabilities (UNESCO, 2020). Secondary school teachers play a pivotal role in attaining sustainability through the integration of environmental principles into pedagogy. Successful environmental education is dependent on experiential learning mechanisms such as project work, community service, and fieldwork in addition to theoretical knowledge (Jucker & Mathar, 2019). This gives students the capacity to internalize real environmental issues and directly contribute to sustainable action.

Teachers model environmentally friendly behaviour and influence students' attitudes and behaviours towards the environment, and therefore, it is crucial to train teachers with professional qualifications in environmental education (Summers et al., 2021). Most research suggests that more environmentally literate teachers are more effective at motivating students and promoting sustainability-oriented activities in schools (Mogensen & Schnack, 2022). Despite the global consensus on the importance of environmental education, some challenges limit its successful implementation in secondary schools. They are inadequate teaching, inadequate resources, and inadequate institutional support. Most teachers grumble about inadequate curriculum coverage of environmental concerns and inadequate



pedagogical support for the incorporation of EE across the curriculum (Evans & Ferreira, 2021). These issues must be addressed through a multi-stakeholder process, with policymakers, teachers and communities being involved in the design of inclusive environmental education frameworks.

ENVIRONMENTAL EDUCATION AND SUSTAINABLE DEVELOPMENT: CONCEPT AND RELATIONSHIP

Environmental education gives individuals values, knowledge, and skills to address environmental issues and ensure responsible action. Sustainable development ensures environmental, social, and economic sustainability in the long run for future generations. Both these concepts are interconnected as environmental education encourages awareness and action towards the achievement of sustainable development goals and ensuring overall societal and ecological well-being.

Definition of Environmental Education

Environmental education is a systematic process that enables people to gain knowledge, skills, and values to comprehend and tackle environmental challenges (Tilbury, 2019; Palmer, 2020). It is based on fundamental principles of interdisciplinarity, holism, and participatory learning. These principles stress that environmental learning must not be limited to isolated subjects but incorporated in an interdisciplinary and experiential manner. This process builds critical thinking and problem-solving capacities and encourages people's personal connection with nature (Gough, 2021). It also promotes community involvement and experiential learning, engaging teachers to connect theoretical knowledge with practical applications. This holistic process not only informs students about ecological processes but also enables them to become active environmental stewards (Mogensen & Schnack, 2022).

Concept of Sustainable Development

Sustainable development is a complex concept that refers to development that is able to meet the needs of the current generation without compromising the ability of the next generation to meet their own needs (Brundtland Commission, 1987). This definition suggests that there is a need to balance social justice, economic development, and the protection of the environment. Environmental conservation, economic stability, and social justice are the most significant aspects of sustainable development. Environmental conservation focuses on the conservation of ecosystems and natural resources, economic stability focuses on sustainable and inclusive growth, and social justice delivers equity in resource distribution as well as equal opportunity (United Nations, 2015; Sachs, 2020).



These three dimensions complement one another to create an even framework that guides policymaking as well as practical action towards long-term ecological as well as societal well-being.

Relationship between Environmental Education and Sustainable Development

Environmental education and sustainable development are interdependent. Environmental education is vital to sustainable development as it equips individuals with the necessary knowledge and skills to address the issues of sustainability. Environmental education allows one to understand the complex interdependencies between human societies and ecosystems, leading to sustainable behavior (UNESCO, 2020). The learning one gains through environmental education allows individuals to value the interdependence of economic, social, and environmental factors, thus making the right decisions leading to sustainable development (Palmer, 2020). Environmental education is not learning facts but forming responsible and ethical attitudes towards the utilization of resources and environmental management. Education can empower individuals to change behavior needed for sustainable development.

ROLE OF SECONDARY SCHOOLS AND TEACHERS IN ENVIRONMENTAL EDUCATION

Secondary schools and teachers play a vital role in environmental education by integrating sustainability into curricula, fostering eco-friendly habits, and adopting innovative teaching methods. Educators act as facilitators, guiding students toward environmental responsibility through hands-on learning experiences, school projects, and interdisciplinary studies. These efforts help shape informed global citizens who are accountable for promoting sustainable development.

Role of Schools in Promoting Environmental Awareness

Schools play a pivotal position in bringing the philosophy of environmental education and sustainable development into implementation. Since schools are institutions of education, they offer systematic settings through which theoretical knowledge can be linked with actual action. Secondary schools are especially important places for developing environmental awareness among the youth. Teachers in such institutions are best placed to incorporate environmental education into various subjects, thus establishing a multidisciplinary process that supports sustainable behaviour (Jucker & Mathar, 2019).

Apart from curricular integration, schools can enhance sustainability through extracurricular activities, community projects and collaborations with environmental organizations. Such initiatives offer students hands-on experience and exposure to local environmental challenges. Through such participation, students acquire the value of environmental stewardship and become responsible members of their communities (Leal Filho, Salvia, & Pretorius, 2020). In addition, when educators demonstrate environmentally friendly practices, they not only reinforce the validity of the learning message but also



encourage students to implement similar habits in their everyday lives (Summers, Corney, & Childs, 2021).

Role of Secondary School Teachers in Environmental Education

Secondary school educators hold a central role in developing environmental education in learning institutions. Their work goes beyond conventional teaching to include a multi-dimensional role of developing environmental consciousness, incorporating applicable content into the curriculum, and using innovative pedagogies that enable learners to become actively involved in sustainable practices.

Teachers as Environmental Awareness Facilitators: Teachers are not just instructors but also mentors who instill environmental consciousness in young minds. By modeling sustainable practices and engaging in discussions on everyday environmental issues, teachers act as facilitators of environmental knowledge (Tilbury, 2019). They simplify complex ecological issues by breaking down abstract concepts into understandable contexts. This role is particularly important at the secondary level, where students begin to question societal issues and better comprehend the broader impacts of climate change and environmental degradation (Palmer, 2020). Through classroom discussions, community involvement, and engagement with local environmental issues, educators inspire students to develop a personal connection to environmental stewardship.

Integrating Environmental Concepts into School Curricula: To make sustainability an integral part of the learning process, it is essential to embed environmental education within school curricula. Teachers should integrate environmental concepts across multiple subjects, including science, geography, social studies, and even literature. This interdisciplinary approach helps students see the environment not as an isolated subject but as a fundamental aspect of human life, interconnected with economic, social, and cultural dimensions (Gough, 2021). For example, discussions on biodiversity can be linked to economic policies or ethical considerations, providing students with a holistic understanding of how the environment influences various aspects of life. By incorporating these concepts into everyday lessons, teachers ensure that environmental awareness becomes an essential part of students' education.

Environmental Teaching Strategies: Effective teaching strategies play a vital role in delivering meaningful environmental education. Many secondary school teachers combine traditional and innovative pedagogical methods to make environmental learning engaging and relevant. Hands-on learning experiences, such as field trips, laboratory experiments, and project-based learning, help students connect theoretical knowledge to real-world applications (Jucker & Mathar, 2019). For instance, maintaining school gardens or participating in community conservation projects allows students to observe ecological principles in action, deepening their understanding of environmental



processes. Additionally, the use of digital resources and interactive tools has been shown to enhance student engagement, making abstract environmental concepts more tangible and fostering critical discussions in the classroom (UNESCO, 2020).

Engaging Students in Green Practices: Teachers can encourage students to adopt sustainable habits by creating a learning environment that fosters curiosity and initiative. Organizing environmental clubs, recycling campaigns, and sustainability fairs provides students with opportunities to implement and showcase their eco-friendly projects (Leal Filho, Salvia, & Pretorius, 2020). These activities not only develop practical skills but also instill a sense of social responsibility. When students actively participate in hands-on projects, they witness the real-world impact of their actions, reinforcing their commitment to sustainable practices. Teachers who facilitate such initiatives bridge the gap between theoretical knowledge and real-life application, embedding sustainability into students' everyday experiences.

Developing Critical Thinking and Problem-Solving Skills for Sustainability: A critical component of environmental education is the development of critical thinking and problem-solving skills. In today's rapidly changing world, secondary school teachers are tasked with preparing students to confront complex sustainability challenges. By incorporating problem-solving learning methods into their teaching, educators encourage students to examine environmental issues from diverse viewpoints and create original solutions (Summers, Corney, & Childs, 2021). Classroom exercises involving debates, role-plays and scenario analysis foster critical thinking and the development of skills for evaluating the possible effects of a range of actions on the environment. These exercises not only construct academic proficiency but also instil an ethical and active attitude towards the protection of the environment. While learning to value interdependency between economic, social and ecological structures, which forms the fundamental idea of sustainable development (Palmer, 2020), they identify problems and come up with solutions.

ISSUES ENCOUNTERED BY TEACHERS IN PROMOTING ENVIRONMENTAL EDUCATION

Good environmental education is important for equipping students to tackle such immediate global concerns as climate change and loss of biodiversity. Yet, secondary school teachers face a number of challenges that discourage them from incorporating concepts of sustainability into the curriculum. Among these are inadequate training and sensitization, poor teaching resources, institutional and administrative limitations, challenges in reaching students, and the requirement of strong policy support.

Insufficient Training and Sensitization of Teachers

Most teachers document that their initial teacher training programs do not fully address environmental education. Consequently, the teachers lack pedagogical expertise needed to describe intricate ecological principles and renewable practices (Tilbury, 2019). Professional growth is needed continually; however, many teachers report limited chances for further training in environmental education (Palmer, 2020). This gap in training not only erodes teachers' confidence but also hinders their capacity to use innovative pedagogies that would better facilitate student comprehension. Without adequate knowledge of prevailing environmental issues and sustainable strategies, teachers might inadvertently provide a superficial treatment of the topic that does not challenge students to take effective action.

Insufficient Teaching Resources and Curriculum Constraints

Another key obstacle is the lack of relevant and current teaching resources. Schools often do not have up-to-date books, digital resources and interactive teaching materials that assist in an active approach to green education (Gough, 2021). Even when material is available, it is often not aligned to present sustainability initiatives or is wedged within entrenched curriculum designs. These frameworks tend to leave little space for interdisciplinary learning, compelling teachers to depend on conventional lecture-based approaches that do not encourage critical thinking or practical problem-solving skills (Summers, Corney, & Childs, 2021). The limited resource pool and rigid curriculum thus lead to a fractured delivery of environmental education.

Institutional Barriers and Administrative Constraints

Institutional factors also play a crucial role. Educational priorities often focus on subjects that are heavily emphasized in standardized testing, reducing the time allocated for environmental studies (Evans & Ferreira, 2021). Additionally, innovative teaching methods like project-based learning and field trips may not be widely supported, as they are often seen as secondary to core academic subjects. Moreover, bureaucratic constraints, such as rigid scheduling and limited flexibility in curriculum planning, further restrict teachers from integrating environmental education into their daily lessons. These institutional barriers force educators to work within a rigid framework, leaving little room for the dynamic, interdisciplinary approaches necessary for effective sustainability education.

Student Engagement and Behavioural Challenges

Motivating students with environmental education is especially challenging because of the diversity of interests and conduct within the classroom. There are students who are apathetic or even resistant to issues that they consider as abstract or not relevant in their everyday living (Mogensen & Schnack, 2022). These behavioural issues like low engagement and disturbances also hinder teachers from



adopting interactive and participatory learning processes. Teachers are thus required to put additional effort into planning lessons that are both interesting and related to everyday life such as frequently using innovative strategies like outdoor activities, community-based projects and problem-solving learning. But if proper support or training in these new strategies is lacking, maintaining student interest is a tough obstacle.

Need for Policy Support and Government Initiatives

Efforts to implement environmental education face significant challenges due to insufficient policy support at both national and local levels. Many educators argue that schools are unlikely to prioritize environmental education unless they receive clear directives and financial backing from government agencies (UNESCO, 2020). Well-structured policies can provide the necessary guidance, incentives, and resources to effectively integrate sustainability into school curricula. Government initiatives focusing on teacher training, curriculum development, and access to modern learning materials are crucial in addressing the systemic challenges educators face. Establishing strong policy frameworks would ensure that environmental education is not treated as an optional supplement but rather as an essential component of the education system.

STRATEGIES TO ENHANCE ENVIRONMENTAL AWARENESS AMONG TEACHERS AND STUDENTS

Raising awareness among both teachers and students is fundamental to fostering a culture of sustainability within schools. This can be achieved through a comprehensive approach that includes integrating environmental topics into the curriculum, providing teacher training, adopting innovative learning methods, and encouraging community engagement. The following strategies can be used to promote environmental awareness:

Integrating Environmental Themes across Subjects

A highly effective approach is to embed environmental topics across different subjects rather than treating them as an isolated course. Incorporating sustainability issues into science, social studies, language, and the arts helps students understand how environmental challenges are interconnected with various aspects of life (Palmer, 2020). For example, educators can explore the economic impact of climate change in mathematics classes or discuss environmental justice in social studies. This interdisciplinary approach not only highlights the real-world relevance of environmental concerns but also encourages students to analyse global issues from a broader, more holistic perspective (UNESCO, 2020).



Professional Development Programs for Teachers on Environmental Education

Professional training plays a vital role in educating teachers with the knowledge and competencies required to efficiently impart environmental education. Facilitated workshops, seminars and online training can familiarize instructors with up-to-date environmental issues and creative pedagogical techniques. Sustainability literacy programs can familiarize teachers with the most recent scientific information and policy updates, thereby equipping them to deconstruct advanced environmental ideas into stimulating lessons (Tilbury, 2019). Continuing professional development also creates a community of practice for teachers in which resource sharing and best practice lead to continuous improvement (Summers, Corney, & Childs, 2021).

Application of Innovative Pedagogies

Implementing innovative pedagogies like experiential learning, project-based learning and the utilization of ICT-based tools is critical for active participation. Experiential learning, via field trips, outdoor experiments or gardening with the community, enables students to engage directly with nature, hence gaining more in-depth knowledge on environmental processes (Gough, 2021). Project-based learning inspires students to solve real-life problems like developing solutions to minimize waste or save water within their school, inculcating critical thinking and problem-solving abilities. Besides, the inclusion of ICT resources such as virtual simulations and web-based collaboration tools can extend interactive learning and enable students to view global perspectives towards facing sustainability challenges (UNESCO, 2020).

Promoting School-Based Environmental Clubs and Projects

Creating school-based environmental clubs and projects provides students with hands-on experiences that extend learning beyond the classroom. Clubs focused on recycling, energy conservation, or biodiversity can foster peer education and a sense of ownership over sustainability initiatives. These programs allow students to see their ideas come to life, bridging the gap between theory and practice. Additionally, such initiatives encourage collaboration across different subjects, reinforcing the idea that sustainability challenges require collective problem-solving (Palmer, 2020). Moreover, when schools celebrate events like Earth Day or organize environmental fairs, they raise public awareness and spark meaningful community discussions about sustainability.

Collaborations with NGOs, Governmental Agencies, and Local Communities

Partnering with external organizations plays a key role in enhancing environmental education by bringing in additional expertise and resources. NGOs, government agencies, and local communities can offer real-world insights, guest lectures, and field opportunities that enrich the school curriculum. For



example, local environmental agencies can collaborate with schools to host workshops on biodiversity conservation or pollution control measures. These partnerships help bridge the gap between classroom learning and real-world environmental issues, making education more practical and action-oriented (Tilbury, 2019). Furthermore, such collaborations can also provide funding for school-based sustainability projects and offer students opportunities to participate in broader environmental initiatives, fostering civic engagement and a deeper sense of responsibility.

CONCLUSION

Incorporation of environmental education in secondary schools is crucial to prepare the future generation to tackle sophisticated sustainability issues. The current debate emphasizes the central position of secondary school teachers in the dissemination of environmental education and the development of sustainable habits among students. To ensure this, clearly outlined environmental education policies have to be formulated and put into practice at national and institutional stages. These policies have to compel the integration of sustainability in school curricula and provide the required funds and resources to enable such programs.

Sustainability has to be incorporated into teacher preparation education. Teachers' pre-service and in-service education has to incorporate core environmental issues and innovative new methods of pedagogy, so that teachers can provide vibrant, integrated lessons. Contemporary pedagogy, like experiential learning, project-based learning, and technology-enabled instruction, holds great promise to connect theoretical concepts to real-world issues. Lastly, the establishment of school-based environmental programs and the promotion of collaboration with NGOs and local communities further enhances the learning process by extending education outside the classroom. There is a call for a joint effort between governments, schools, and community stakeholders to address current challenges and integrate environmental education as a central part of the education system. This collective effort is a vital step toward the establishment of an informed and responsible generation that can propel sustainable development.

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