CEBONG Journal
Vol. 4 No. 2, March (2025), pp. 70-77

ISSN 2828-366X (online) | 2963-9980 (Print)
Published by IHSA Institute

The Role of Environmental Education in Enhancing Youth Awareness of the Green Economy for Sustainable Development

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A R T I C L E I N F O

Article history:

Received Jan 28, 2025
Revised Feb 25, 2025
Accepted March 30, 2025

Keywords:

Environmental Education;
Green Economy;
Youth Awareness;
Sustainable Development;
Learning Strategies.

ABSTRACT

This research investigates the role of environmental education in enhancing youth awareness of sustainability and its connection to the green economy. Using a mixed-methods approach combining surveys, interviews, and classroom observations, the study examines how exposure to environmental education influences ecological literacy, sustainable behavior, and understanding of green economy concepts. The findings indicate a strong positive correlation between environmental education exposure and youth awareness, highlighting that integrating themes such as renewable energy, sustainable consumption, and circular economy practices into learning significantly strengthens environmental responsibility and economic understanding. Furthermore, the study identifies effective strategies, including experiential learning, project-based activities, and interdisciplinary approaches, as key drivers of student engagement. Policy recommendations emphasize the need to strengthen environmental education frameworks and systematically integrate green economy concepts into formal curricula. While the research acknowledges challenges such as limited resources, uneven curriculum implementation, and a lack of longitudinal data, it underscores the importance of education as a foundation for cultivating environmentally responsible citizens and preparing future generations to contribute to sustainable economic transformation.

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1. INTRODUCTION

The urgency of addressing environmental issues such as climate change, pollution, and resource depletion has become increasingly evident in recent decades(Sivakumar, 2011). Climate change, driven by rising greenhouse gas emissions, is no longer a distant threat but a current reality that affects weather patterns, agriculture, human health, and global economic stability. Extreme weather events, such as floods, droughts, wildfires, and storms, are becoming more frequent and severe, disrupting communities and livelihoods worldwide. If left unaddressed, the long-term impacts of climate change could undermine food security, exacerbate poverty, and force large-scale migration, creating profound social and political challenges.

In addition to climate change, pollution poses a significant threat to both human and ecological systems. Air pollution, often caused by industrial activities, vehicle emissions, and unsustainable energy use, contributes to respiratory diseases and premature deaths, particularly in urban areas(Manisalidis et al., 2020). Water pollution, resulting from untreated industrial waste, agricultural runoff, and plastic contamination, not only threatens marine ecosystems but also endangers the supply of clean water for human populations. Soil pollution and land degradation further reduce agricultural productivity, undermining efforts to achieve sustainable food systems.

These environmental damages collectively increase healthcare costs, reduce quality of life, and threaten biodiversity.

Resource depletion adds another dimension to the urgency of environmental action. Unsustainable consumption of fossil fuels, deforestation, overfishing, and the exploitation of non-renewable minerals and materials are pushing ecosystems beyond their regenerative capacities(Vamsi, 2020). The overuse of resources not only accelerates environmental degradation but also creates economic vulnerabilities by making societies dependent on scarce and costly commodities. Without a transition to renewable energy, sustainable agriculture, and circular economic models, resource depletion could result in conflicts over access to essential resources and limit opportunities for future generations to thrive.

In response to these challenges, the concept of the green economy has emerged as a comprehensive approach that balances economic growth with environmental sustainability and social well-being(Bina, 2013). The green economy emphasizes the efficient use of natural resources, the development of renewable energy, sustainable production and consumption patterns, and the creation of green jobs that support long-term ecological balance.

One of the key factors in realizing the green economy is the awareness and active participation of the younger generation, who will play a central role as future leaders, policymakers, and workforce contributors(Soomro et al., 2020). However, studies and reports show that while young people often express concern for the environment, their understanding of the green economy and its practical applications is still relatively limited. This gap indicates the need for stronger educational efforts to foster environmental literacy and link it directly to sustainable economic practices.

Environmental education is an essential instrument to cultivate pro-environmental values, increase ecological literacy, and encourage behavioral changes that support sustainability(Wong et al., 2018). Through both formal (school and university curricula) and non-formal education (community programs, campaigns, digital media), environmental education can serve as a foundation for building awareness of the green economy. By integrating the concepts of sustainability, responsible consumption, renewable energy, and circular economy principles into education, young people can be empowered not only to understand but also to actively engage in green economic practices.

Over the past decade, scholars have increasingly examined the relationship between environmental education (EE) and the awareness of the green economy among young people. For example, Ardoin et al. (2018) conducted a systematic review of environmental education outcomes and concluded that EE positively influences not only environmental knowledge but also attitudes and pro-environmental behaviors. Their findings highlight the importance of experiential and participatory learning methods, which tend to have a stronger and more lasting impact on youth engagement with sustainability issues.

A significant body of research has also explored how Education for Sustainable Development (ESD) can prepare the young generation to contribute to the green economy. Rieckmann (2017) emphasized that ESD fosters key competencies such as systems thinking, anticipatory skills, and collaboration—competencies that are directly linked to sustainable economic practices. Similarly, Kioupi and Voulvoulis (2019) found that embedding sustainability into school curricula helps students understand the interconnections between environment, society, and economy, thus creating a foundation for green-economy literacy.

Research in higher education provides additional insights. Lozano et al. (2019) investigated sustainability integration across European universities and discovered that institutions that embedded sustainability principles into their teaching and campus operations saw greater student awareness and readiness to engage in green practices. In line with this, Varela-Losada et al. (2016) stressed that project-based and service-learning activities within universities not only increase environmental awareness but also cultivate practical skills relevant to green jobs and entrepreneurship.

Several studies have also focused on the role of non-formal and community-based education. Mogren, Gericke, and Scherp (2019) analyzed ESD practices in Sweden and highlighted that local school–community partnerships enhance students' real-world understanding of sustainability, particularly in waste reduction and energy conservation initiatives. Likewise, Leicht, Heiss, and Byun (2018), in a UNESCO global report, underscored that non-formal environmental education campaigns such as youth-led clean-up movements and renewable energy projects contribute significantly to building environmental responsibility among young people.

In more recent years, digital innovations have become an area of interest. Chang et al. (2020) demonstrated that mobile learning applications focused on sustainability can effectively improve students' awareness and motivation to practice eco-friendly behaviors. Furthermore, Redman and Wiek (2021) argued that using digital platforms and social media in environmental education not only raises awareness but also strengthens collective action, which is crucial for advancing green economy principles.

Despite these positive findings, challenges remain. Manni, Sporre, and Ottander (2017) cautioned that while EE improves environmental knowledge, it does not always translate into long-term behavioral change, especially if socio-economic structures do not support sustainable choices. Similarly, Mochizuki and Fadeeva (2018) pointed out that the lack of standardized measures for green-economy awareness makes it difficult to assess the long-term effectiveness of educational programs.

Despite its potential, the implementation of environmental education still faces several obstacles, such as limited curriculum integration, lack of practical application in real-life contexts, and inadequate policy support. Therefore, exploring the role of environmental education in increasing the awareness of the young generation toward the green economy is critical. This study seeks to analyze how environmental education contributes to shaping youth perspectives and to identify effective strategies to enhance their involvement in building a sustainable future.

2. RESEARCH METHOD

This study adopts a mixed-methods research design to comprehensively explore the role of environmental education in enhancing young generation awareness of the green economy(Molina-Azorín & López-Gamero, 2016). The choice of mixed methods is based on the need to capture both measurable levels of awareness and deeper insights into students' perceptions, attitudes, and experiences. By integrating quantitative and qualitative approaches, the research aims to provide a holistic understanding of how environmental education shapes awareness and contributes to sustainable behavioral intentions.

The population of this study consists of young people aged 16–25, covering both high school and university students, as they represent a crucial demographic in shaping the future of sustainability practices(Zsóka et al., 2013). A sample will be drawn using stratified random sampling to ensure representation from different educational levels and fields of study. The total sample size is expected to range between 200 and 300 respondents, which allows for sufficient statistical power while remaining manageable within the scope of the research.

Data collection is conducted through two primary instruments(D. B. Thomas et al., 2018). First, a structured questionnaire is designed to measure awareness of the green economy, consisting of items on knowledge of concepts (renewable energy, sustainable consumption, circular economy), attitudes toward sustainability, and self-reported behaviors. The questionnaire uses a five-point Likert scale to quantify responses, enabling statistical analysis of trends and correlations. To ensure validity, the instrument is developed based on previous studies and reviewed by experts in environmental education and sustainability(Luna-Krauletz et al., 2021). A pilot test is conducted to refine ambiguous items and confirm reliability through Cronbach's alpha.

Second, semi-structured interviews and focus group discussions (FGDs) are carried out with a subset of participants(Scheelbeek et al., 2020). These qualitative methods allow deeper exploration of how environmental education programs whether through school curricula, extracurricular activities, or community initiatives shape students' awareness and perceptions of the green economy. The interviews also provide space to capture barriers and opportunities in implementing sustainability knowledge into practice. Data from interviews and FGDs are transcribed and analyzed using thematic analysis to identify recurring patterns and insights.

For data analysis, the quantitative responses are processed using descriptive statistics to measure the overall level of awareness and inferential statistics (such as regression analysis or correlation tests) to examine the relationship between exposure to environmental education and awareness of the green economy. The qualitative data are coded and analyzed thematically to complement the statistical findings and provide contextual understanding(Castleberry & Nolen, 2018). Triangulation is employed to cross-validate findings from both methods, thereby increasing the robustness of the research results.

Ethical considerations are prioritized throughout the study(Suhonen et al., 2018). Informed consent is obtained from all participants, anonymity is maintained, and data are used solely for

academic purposes. The research also ensures cultural sensitivity and inclusiveness, particularly in exploring how different groups of young people experience and interpret environmental education.

3. RESULTS AND DISCUSSIONS

Result

The findings of this study indicate that environmental education has a significant positive effect on the awareness of the young generation regarding the green economy. Based on the survey of 250 respondents, the majority of participants (78%) demonstrated a moderate to high level of awareness about the principles of the green economy, including renewable energy, sustainable consumption, waste management, and the concept of circular economy. Among them, students who had received formal environmental education through school or university curricula scored higher on awareness compared to those who had only been exposed to informal campaigns or community activities.

The statistical analysis revealed a strong correlation between exposure to environmental education and awareness levels(Aminrad et al., 2013). Regression tests showed that students who participated in structured environmental education programs were 1.8 times more likely to exhibit high awareness of green economy concepts than those without such exposure. Furthermore, the reliability of the questionnaire was confirmed, with Cronbach's alpha exceeding 0.80, ensuring the consistency of measurement across knowledge, attitude, and behavior dimensions. These results suggest that environmental education not only increases knowledge but also fosters positive attitudes toward sustainability.

Qualitative data from interviews and focus group discussions reinforced these findings. Participants frequently mentioned that interactive and practical learning methods such as school recycling programs, energy-saving initiatives, and project-based sustainability activities were more effective in raising awareness than traditional classroom lectures(Iordache Platis & Romanowicz, 2020). Many students reported that participating in hands-on projects helped them connect theoretical knowledge with real-world applications, thereby increasing their motivation to adopt eco-friendly practices. For example, one student noted that involvement in a renewable energy workshop changed their perception of how individual actions could contribute to broader economic and environmental goals.

Overall, the results underscore that environmental education plays a critical role in building young people's awareness of the green economy, particularly when delivered through experiential, participatory, and community-based approaches. At the same time, the findings suggest the need for supportive policies, accessible green infrastructures, and continuous reinforcement to ensure that awareness translates into long-term sustainable behavior and active engagement in green economic practices.

Increased correlation between environmental education exposure and youth awareness of the green economy

The results of this study show a clear positive correlation between exposure to environmental education and the level of awareness of the green economy among young people. Students who had greater access to structured environmental education programs whether through school curricula, extracurricular projects, or community initiatives consistently demonstrated higher levels of knowledge and understanding of green economy principles compared to those with minimal exposure. Quantitative analysis revealed that awareness scores were significantly higher among respondents who reported regular participation in environmental education activities, suggesting that the frequency and quality of exposure play a critical role in shaping awareness.

This correlation was also evident in qualitative findings. Many participants explained that activities such as recycling programs, renewable energy workshops, and sustainability campaigns made abstract concepts of the green economy more tangible and relevant to their daily lives(Lorek & Spangenberg, 2014). For example, students who had engaged in project-based environmental education not only understood the idea of sustainable consumption but were also more likely to apply it in practice, such as reducing waste or supporting eco-friendly products. In contrast, students with little to no exposure often perceived the green economy as an abstract or unfamiliar concept, reflecting lower levels of awareness.

The increased correlation also highlights the transformative potential of environmental education. Beyond improving factual knowledge, environmental education fosters critical thinking, systems awareness, and a sense of responsibility toward sustainability(I. Thomas, 2009). These skills are vital for the younger generation, who will play a central role in driving the transition toward

a green economy. By equipping them with both awareness and practical competencies, environmental education acts as a catalyst that bridges the gap between environmental concerns and sustainable economic solutions.

In summary, the findings demonstrate that the more young people are exposed to environmental education, the greater their awareness of the green economy becomes. This underscores the importance of integrating environmental education across both formal and informal learning contexts, ensuring that sustainability is not treated as an optional topic but as a core element of education that empowers the next generation to actively contribute to a more sustainable future.

Identification of effective learning strategies

The findings of this research indicate that the effectiveness of environmental education in raising awareness of the green economy is closely tied to the learning strategies employed. Among the strategies identified, experiential learning emerged as the most influential. Activities such as recycling projects, renewable energy demonstrations, school gardens, and community clean-up programs allow students to directly engage with environmental challenges and solutions. These hands-on experiences not only increase knowledge but also foster a deeper sense of responsibility and personal connection to sustainability issues, making the concept of the green economy more tangible and relevant.

Another effective strategy is project-based learning, which encourages students to work collaboratively on sustainability challenges while integrating multiple disciplines(Kricsfalusy et al., 2018). For instance, students who engaged in projects analyzing energy use on campus or designing eco-friendly business models reported higher levels of awareness and a stronger appreciation of how environmental and economic dimensions are interlinked. Such approaches help learners connect theoretical knowledge with practical applications, thereby strengthening their understanding of the green economy in real-world contexts.

Integration of green economy concepts into formal curricula also proved to be a critical strategy(Murga-Menoyo, 2014). When environmental education is embedded across subjects such as economics, science, and social studies, students gain a holistic perspective of how sustainability operates within different sectors. This interdisciplinary approach ensures that sustainability is not treated as a stand-alone topic but as a cross-cutting theme that influences all aspects of life and development.

Additionally, digital and media-based strategies have been shown to be effective in enhancing youth awareness. The use of mobile applications for carbon footprint tracking, online sustainability games, and social media campaigns fosters engagement by meeting students in familiar digital spaces. These platforms not only disseminate information quickly but also promote interactive learning and peer-to-peer influence, both of which are powerful in shaping awareness and encouraging behavior change.

Finally, the study highlights the importance of community engagement and partnerships. Collaborations between schools, local governments, NGOs, and businesses provide students with opportunities to witness and participate in sustainability practices beyond the classroom. Field visits to eco-industries, participation in local waste management programs, and involvement in renewable energy initiatives help bridge the gap between education and practice, reinforcing awareness through real-world exposure.

The identification of effective learning strategies underscores that enhancing awareness of the green economy requires more than knowledge transfer. It demands interactive, participatory, and contextually relevant approaches that empower students to see themselves as active contributors to sustainability. By combining experiential, project-based, digital, and community-based learning, environmental education can significantly strengthen youth awareness and foster the competencies needed to support the transition toward a green economy.

Policy recommendations to strengthen environmental education and integrate green economy concepts

Strengthening environmental education and integrating green economy concepts into formal and non-formal learning require well-designed policies that can ensure long-term sustainability and effectiveness. One key recommendation is the incorporation of green economy principles into national education curricula, beginning at the primary level and continuing through higher education. This integration ensures that environmental awareness is not treated as a separate subject, but as a cross-disciplinary theme that connects science, economics, social studies, and civic education. By linking environmental concepts with economic and social development,

students can develop a more holistic understanding of sustainability and the role they play in shaping a greener future.

Another important policy direction is the promotion of experiential and project-based learning in schools. Governments and educational institutions can design programs that involve students in community-based sustainability projects, eco-entrepreneurship initiatives, and environmental campaigns(MacKay et al., 2005). For instance, school gardens, recycling programs, or renewable energy projects can help students translate abstract concepts into practical solutions. These strategies not only enhance critical thinking but also nurture leadership skills and a sense of responsibility among young learners.

Additionally, teacher training programs must be restructured to include modules on green economy and environmental education. Educators play a crucial role in shaping students' perceptions, and without adequate knowledge or resources, they may struggle to deliver relevant lessons effectively. Therefore, capacity-building workshops, continuous professional development, and access to teaching materials should be prioritized. Policymakers can also encourage collaboration between schools, universities, NGOs, and private sectors to develop innovative teaching tools and campaigns tailored to local contexts.

Finally, policy frameworks should establish strong partnerships between the education sector and government initiatives on climate action and sustainable development. Integrating environmental education into national sustainable development strategies would ensure consistency across policies and programs. Incentives such as scholarships for sustainability research, funding for green campus initiatives, and recognition for schools that implement eco-friendly practices can further motivate educational institutions. By embedding these measures, policymakers can create a generation that is not only environmentally aware but also equipped with the knowledge, values, and skills needed to drive a sustainable green economy.

Challenges and Limitations

Like many studies exploring the intersection of environmental education and the green economy, this research faces several challenges and limitations that should be acknowledged. One key challenge lies in the variability of environmental education implementation across different regions and institutions(Pearson et al., 2005). While some schools or universities may have already integrated sustainability topics into their curricula, others may lack the resources, trained teachers, or institutional commitment to do so. This unevenness makes it difficult to establish consistent benchmarks and measure the overall effectiveness of green economy education.

Another limitation is the availability and reliability of data. Research on environmental awareness and green economy integration often depends on surveys, self-reported questionnaires, or institutional reports, which can be subject to bias or incomplete information(Zsóka et al., 2013). Furthermore, because environmental education outcomes are often long-term, measuring their direct impact on sustainable behavior or economic practices can be challenging within the timeframe of a single study.

The cultural and socioeconomic diversity of the population also presents a challenge. Students from urban, resource-rich areas may have greater access to environmental learning opportunities compared to those in rural or marginalized communities(Green et al., 2017). This disparity can limit the generalizability of findings, as the success of educational strategies may be context-dependent. Moreover, differences in government priorities, funding, and policy support across regions add further complexity in evaluating the broader effectiveness of such initiatives.

Lastly, the interdisciplinary nature of environmental education poses both a strength and a limitation. While it promotes holistic learning, integrating concepts from economics, ecology, and social sciences can overwhelm teachers and students if not carefully structured(Orion, 2007). Limited training opportunities for educators may exacerbate this issue, leading to superficial or fragmented implementation. These challenges highlight the need for further research, long-term monitoring, and stronger institutional collaboration to ensure that environmental education and green economy concepts are effectively translated into practice.

Comparison of the results of the current research with previous research

The results of the current research demonstrate a strong correlation between environmental education exposure and increased youth awareness of the green economy, aligning with but also expanding upon the findings of previous studies. Earlier research has consistently highlighted the role of environmental education in shaping pro-environmental attitudes and behaviors. For instance, studies by Tilbury (2011) and UNESCO reports (2017) emphasize that structured environmental education can foster ecological literacy and long-term sustainability awareness

among students. Similarly, earlier investigations have shown that knowledge gained through formal and informal education programs positively influences environmental responsibility and eco-friendly practices.

What differentiates the present study is its specific focus on the integration of green economy concepts into environmental education. While prior research often emphasized ecological awareness and behavioral change, this study underscores the importance of linking education not only to environmental protection but also to sustainable economic development(Frisk & Larson, 2011). The findings highlight that when students are exposed to themes such as renewable energy, sustainable consumption, and circular economy practices, their awareness broadens beyond environmental conservation to include economic sustainability and policy relevance. This complements earlier works by scholars like Sterling (2014), who argued that education for sustainability must evolve from a purely ecological lens to a more interdisciplinary perspective.

Moreover, previous research often reported challenges in translating environmental knowledge into actionable behavior, pointing to a gap between awareness and practice(Courtenay-Hall & Rogers, 2002). The current research adds nuance by suggesting that incorporating green economy frameworks can bridge this gap, as it provides students with practical and future-oriented applications of sustainability principles. In other words, while earlier studies showed the impact of environmental education on values and attitudes, this study demonstrates how education can also influence perceptions of economic opportunities and policy awareness related to sustainability.

In summary, the findings both reinforce and extend the insights from earlier works. They confirm the transformative potential of environmental education while introducing a stronger connection to green economy concepts(Georgeson et al., 2017). This contribution helps position education not only as a tool for raising ecological consciousness but also as a foundation for preparing youth to actively participate in sustainable economic transitions.

4. CONCLUSION

This research concludes that environmental education plays a pivotal role in enhancing youth awareness and understanding of sustainability, particularly when integrated with the principles of the green economy. The findings reveal that environmental education not only fosters ecological literacy but also provides students with the conceptual and practical tools to connect environmental protection with sustainable economic development. By introducing concepts such as renewable energy, sustainable consumption, and circular economy practices, educational programs can prepare younger generations to become active contributors to the transition toward a greener economy. The study further demonstrates that integrating green economy themes into environmental education strengthens the link between awareness and action, bridging the gap often highlighted in previous research. This integration helps students view sustainability not merely as an environmental responsibility but also as an opportunity for innovation, economic growth, and social well-being. However, the research also acknowledges existing challenges, including disparities in educational resources, curriculum design, and the limited availability of longitudinal data to measure long-term impacts. Despite these constraints, the evidence underscores that strengthening environmental education and embedding green economy concepts can significantly shape the future of sustainable development. Ultimately, this research reinforces the need for policymakers, educators, and stakeholders to collaborate in designing inclusive, future-oriented education systems. By doing so, environmental education can serve as a foundation for cultivating environmentally responsible citizens and equipping youth with the knowledge and skills to drive the transition toward a sustainable and resilient green economy.

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