

The Influence of Sustainability Education on Students Environmental Attitudes and Sustainable Actions

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Abstract

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Sustainability education plays a vital role in fostering awareness, attitudes, and behaviors that support sustainable development, particularly among university students. This study aims to examine how sustainability education influences environmental attitudes and promotes students' engagement in sustainable actions. Using a Systematic Literature Review approach, focusing on sustainability education, attitude transformation, and sustainable practices in higher education. The findings indicate that sustainability education significantly enhances students' critical awareness and strengthens pro-environmental values, leading to practical actions such as energy conservation, waste reduction, and participation in campus-based green initiatives. Furthermore, its effectiveness is shaped by curriculum design, participatory teaching methods, experiential learning, and social support from the academic environment. Thus, sustainability education functions not only as a means of increasing knowledge but also as a transformative tool to shape environmentally responsible behaviors. The study highlights the importance of integrating sustainability education into higher education curricula to prepare future generations for global sustainability challenges.

1. Introduction

Sustainability has become one of the most critical issues of the 21st century, demanding urgent attention from governments, industries, and societies worldwide. Climate change, environmental degradation, and the depletion of natural resources have generated increasing concern about the future of human civilization. In response, the concept of sustainable development, which integrates environmental, social, and economic dimensions, has gained prominence as a guiding principle for global development agendas (United Nations). Within this framework, education plays a crucial role in shaping knowledge, attitudes, and behaviors that are aligned with sustainability goals. Education for sustainability is not only a tool for knowledge transfer but also a transformative process that fosters awareness, critical thinking, and behavioral changes essential for addressing global challenges (Tasdemir & Gazo, 2020).

Higher education institutions, particularly universities, hold a strategic position in promoting sustainability because students are often considered agents of change in society. Through sustainability-oriented education, students are expected to gain not only theoretical knowledge but also practical experiences that encourage them to adopt pro-environmental values and sustainable practices (Taimur & Sattar, 2020). Recent studies indicate that sustainability education contributes significantly to shaping students' environmental awareness and encouraging concrete actions such as energy conservation, waste management, and participation in green campus initiatives (Žalėnienė & Pereira, 2021). These findings highlight the need to

strengthen sustainability education as an integral component of higher education curricula.

One important aspect of sustainability education is its ability to influence students' attitudes toward the environment. Environmental attitude refers to an individual's cognitive, affective, and behavioral tendencies related to environmental protection and conservation. Research has shown that changes in environmental attitudes are often initiated through exposure to sustainability education and real-life experiences with environmental issues (Fadzil et al., 2021). Students who develop positive environmental attitudes are more likely to engage in sustainable actions, demonstrating the strong relationship between knowledge, attitudes, and behaviors (Arshad et al., 2020). Thus, the transformation of environmental attitudes through education becomes an essential step toward cultivating environmentally responsible citizens.

Moreover, sustainability education directly impacts students' sustainable actions. Sustainable actions refer to practical, daily behaviors aimed at reducing negative environmental impacts, such as adopting energy-saving practices, minimizing plastic use, and supporting environmentally friendly policies (Janmaimool & Khajohnmanee, 2019). Previous research has suggested that students who are well-informed about sustainability issues are more likely to translate their knowledge and attitudes into real action. This relationship emphasizes the importance of designing sustainability education programs that go beyond theoretical discussions and incorporate experiential and participatory learning approaches.

However, the effectiveness of sustainability education is influenced by various factors. Studies have identified curriculum design, teaching methods, and extracurricular activities as key elements that determine the success of sustainability education in shaping students' knowledge, attitudes, and actions (Tasdemir & Gazo, 2020). For instance, interactive and project-based learning methods tend to be more effective in promoting sustainable behavior compared to traditional lecture-based teaching. Additionally, the campus environment and peer influence also play an important role in reinforcing sustainability values among students (Stough et al., 2018). These factors highlight the need for a holistic and integrated approach in implementing sustainability education in higher education institutions.

In this context, the present study aims to analyze the influence of sustainability education on students' environmental attitudes and sustainable actions. By employing a Systematic Literature Review (SLR) method. The review specifically examines how sustainability education fosters changes in environmental attitudes, encourages sustainable behaviors, and identifies the key factors that enhance or hinder its effectiveness. The significance of this study lies in its contribution to understanding the transformative potential of sustainability education in higher education and providing insights for policymakers, educators, and institutions to strengthen sustainability-oriented curricula.

Ultimately, sustainability education is not merely about transmitting knowledge but about preparing students to face real-world challenges with critical thinking, problem-solving skills, and a commitment to sustainability. Universities, as centers of innovation and knowledge production, have the responsibility to nurture

a generation that is capable of creating sustainable solutions and influencing broader societal changes. Therefore, integrating sustainability education into higher education curricula is an urgent step toward achieving the goals of sustainable development and ensuring a better future for the next generations.

2. Literature Review

2.1. Sustainability Education and Environmental Attitudes

Sustainability education has been widely recognized as a critical factor in shaping students' environmental attitudes. Attitudes toward the environment encompass values, beliefs, and behavioral intentions that determine how individuals perceive and respond to environmental issues (Parker, 2017). Research consistently shows that education for sustainability plays a transformative role by raising awareness and fostering a sense of responsibility among students. For example, Fadzil et al. (2021) emphasize that environmental awareness is the first step toward changing attitudes, as students who are aware of ecological problems are more likely to develop pro-environmental orientations. Similarly, Arshad et al. (2020) found that sustainability education enables students to understand the interconnection between human activities and environmental consequences, leading to more positive attitudes.

Moreover, universities provide a conducive environment where students can be exposed to sustainability issues through both formal curricula and extracurricular activities. Such exposure encourages critical reflection and value-based learning, which strengthens attitudes toward sustainability (Taimur & Sattar, 2020). The

integration of participatory teaching methods, such as discussions, projects, and experiential learning, also plays a crucial role in encouraging attitudinal change (Tasdemir & Gazo, 2020). Therefore, sustainability education acts not only as a knowledge provider but also as a catalyst for reshaping students' perspectives, ultimately preparing them to adopt pro-environmental values and practices in their daily lives.

2.2. Sustainability Education and Students' Sustainable Actions

Beyond influencing attitudes, sustainability education has a direct impact on students' sustainable actions, defined as behaviors that support long-term environmental and social well-being. Several studies highlight that students who receive sustainability education are more likely to engage in environmentally responsible practices, such as reducing energy consumption, using eco-friendly transportation, and participating in green campus initiatives (Janmaimool & Khajohnmanee, 2019). These actions demonstrate how knowledge and attitudes acquired through education translate into tangible behaviors that contribute to sustainability goals. Woo and Kang (2020) emphasize that sustainability education also helps cultivate leadership qualities among students, enabling them to influence their peers and communities to adopt sustainable lifestyles.

Furthermore, Žalėnienė and Pereira (2021) found that students with a strong foundation in sustainability are more likely to support institutional and policy-level initiatives that promote sustainability within and beyond the university setting. This indicates that sustainable actions are not limited to individual practices but extend to collective and organizational engagement. However, the degree to which students

adopt sustainable actions depends on several mediating factors, such as the availability of supportive infrastructure, social influence, and institutional commitment to sustainability (Tassone et al., 2018). Effective curriculum design that incorporates experiential learning and community engagement has been shown to significantly enhance students' willingness to practice sustainability. Thus, sustainability education not only encourages responsible behavior but also equips students with the motivation and skills necessary to implement sustainable solutions in their daily lives and future careers.

3. Methods

This study employed a Systematic Literature Review (SLR) approach to analyze the relationship between sustainability education, environmental attitudes, and students' sustainable actions. The SLR method was chosen because it provides a rigorous and transparent process for synthesizing existing research, allowing researchers to identify patterns, gaps, and trends across multiple studies (Tasdemir & Gazo, 2020). Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, the review process consisted of several stages: planning, identification, screening, eligibility, and final inclusion. The planning stage involved defining the research questions: (1) How does sustainability education influence students' environmental attitudes? and (2) To what extent does sustainability education encourage students' sustainable actions? These questions guided the search strategy and inclusion criteria.

In the identification stage, relevant studies were collected from Google Scholar, Researchgate and Elsevier. Keywords such as “sustainability education,” “environmental attitudes,” “student sustainable actions,” and “higher education sustainability” were used in combination with Boolean operators to refine the search results. During the screening stage, duplicates were removed, and titles and abstracts were assessed for relevance. Studies that did not address higher education or did not focus on sustainability education were excluded. The eligibility stage required a full-text review of selected articles to ensure that they specifically examined the link between sustainability education and either environmental attitudes or sustainable actions. The inclusion criteria were as follows: peer-reviewed journal articles, focused on higher education contexts, and available in English. Studies that were purely conceptual or not related to sustainability education were excluded.

The final inclusion stage resulted in 12 articles that met all criteria and were used for in-depth analysis. Data were extracted systematically, including author(s), year of publication, country of study, research design, sample population, and key findings. The data synthesis involved thematic analysis, where findings were categorized into two main themes: (1) the role of sustainability education in shaping environmental attitudes, and (2) the role of sustainability education in fostering sustainable actions among students. This structured methodology ensures that the review is comprehensive, reproducible, and credible. By focusing on recent studies and applying systematic selection criteria, the findings of this review provide an updated understanding of how sustainability education contributes to developing

environmentally responsible students and promoting sustainable practices in higher education.

4. Results and Discussion

The systematic literature review conducted for this study revealed several critical insights regarding the impact of sustainability education on university students' environmental attitudes and sustainable behaviors. The analysis of selected studies highlights the transformative role of sustainability education not only in enhancing knowledge but also in shaping students' values, attitudes, and practical engagement with sustainability issues. The results are discussed in two major dimensions: (1) the role of sustainability education in fostering environmental attitudes, and (2) the role of sustainability education in encouraging sustainable actions. Each dimension is explored in relation to factors that either enhance or limit the effectiveness of sustainability education within higher education institutions.

The first major finding concerns the strong correlation between sustainability education and the development of positive environmental attitudes among students. Studies consistently show that exposure to sustainability-focused courses, projects, and campus initiatives significantly increases students' awareness of environmental issues and nurtures values aligned with ecological responsibility. For instance, recent studies by Taimur and Sattar (2020) and Žalėnienė and Pereira (2021) demonstrate that students who participate in sustainability-integrated curricula develop stronger pro-environmental attitudes compared to those in traditional programs. This finding aligns with earlier works suggesting that education is not only about knowledge

transfer but also about preparing individuals to think systematically and critically when facing complex societal and environmental challenges (Stough et al., 2018). The literature further indicates that the cultivation of environmental attitudes is facilitated by interactive learning experiences, such as project-based learning, case studies on local environmental problems, and experiential learning through community service. These pedagogical approaches help students connect theoretical knowledge with real-world challenges, thereby internalizing sustainability values more effectively.

The second dimension revealed by the review concerns the relationship between sustainability education and students' engagement in sustainable actions. Studies indicate that while attitudes provide an important foundation, the transition from attitude to action requires additional factors, including social norms, institutional support, and opportunities for practice. Research by Janmaimool and Khajohnmanee (2019) highlights that students who gain deep knowledge of sustainability issues are more likely to engage in environmentally friendly behaviors, such as reducing energy use, practicing waste segregation, and using sustainable transportation. Moreover, students who are actively involved in campus-based sustainability initiatives often extend these behaviors into their personal lives, suggesting a multiplier effect. This indicates that sustainability education, when combined with supportive institutional environments, can create a culture of sustainability that motivates students to act consistently with their values.

Another important insight concerns the role of curriculum design and pedagogical methods in determining the effectiveness of sustainability education.

Several studies emphasize that fragmented or superficial approaches to teaching sustainability fail to create meaningful changes in attitudes or behaviors. Instead, comprehensive and interdisciplinary programs that integrate sustainability across multiple disciplines appear to be more effective. For example, Tasdemir and Gazo (2020) argue that embedding sustainability principles into economics, engineering, business, and social sciences creates a holistic learning environment that fosters critical thinking and problem-solving skills. This interdisciplinary approach reflects the complex and interconnected nature of sustainability challenges, thereby preparing students to apply sustainable practices across different contexts. Additionally, interactive teaching methods, such as simulations, debates, and collaborative projects, have been found to increase student engagement and foster stronger commitment to sustainability goals.

The review also uncovered evidence that social influence and peer interactions play a significant role in shaping sustainable behaviors. Budowle et al. (2021) suggest that students are more likely to adopt sustainable practices when they are part of communities that value environmental responsibility. Peer-led initiatives, student organizations, and campus sustainability campaigns serve as important drivers of behavioral change by creating social norms that reinforce pro-environmental actions. Furthermore, institutional policies, such as the provision of recycling facilities, green campus transportation systems, and incentives for sustainable practices, create enabling environments that make sustainable behaviors more accessible and rewarding. This interaction between individual attitudes, peer

influence, and institutional support illustrates the multi-layered nature of sustainability education outcomes.

However, the review also reveals several challenges and limitations in the implementation of sustainability education. One recurring issue is the gap between awareness and action, often referred to as the “attitude-behavior gap.” While many students express strong concern for environmental issues after engaging in sustainability education, their actual behaviors may not fully reflect these concerns. Chowdhury and Shumon (2020) suggests that this gap arises due to structural barriers, such as lack of infrastructure, financial constraints, or limited opportunities for sustainable practices in daily life. For instance, students may value sustainable transportation but are unable to act accordingly due to inadequate public transport options. This indicates that educational interventions alone may not be sufficient; they must be complemented by supportive systems that reduce barriers to sustainable actions.

Another challenge identified relates to the uneven integration of sustainability education across different universities and programs. While some institutions have successfully embedded sustainability into their core curricula, others still treat it as an optional or peripheral topic. This creates disparities in students’ exposure to sustainability issues and limits the potential for widespread behavioral change. Woo and Kang (2020) emphasize that universities have a critical role not only in educating individuals but also in shaping future leaders who can influence organizations and policies. Therefore, the institutional commitment to mainstreaming sustainability is crucial for achieving long-term impacts. Without such commitment, sustainability

education risks being marginalized or reduced to isolated projects rather than becoming a transformative element of higher education.

The findings also highlight the importance of cultural and contextual factors in shaping the outcomes of sustainability education. For example, students in countries facing acute environmental challenges, such as air pollution or climate-induced disasters, may demonstrate stronger engagement with sustainability issues due to their lived experiences. Conversely, students in contexts where sustainability is less visible may require more deliberate efforts from educators to create relevance and urgency. This suggests that sustainability education should not adopt a one-size-fits-all approach but rather adapt to the local context, incorporating case studies and examples that resonate with students' realities. Such contextualization enhances the perceived relevance of sustainability education and increases its potential to influence both attitudes and actions.

In addition to individual and institutional factors, the review identifies broader societal influences that shape sustainability outcomes. Government policies, media campaigns, and global sustainability movements, such as the United Nations' Sustainable Development Goals (SDGs), contribute to shaping students' perceptions and motivations. Studies show that when sustainability education is aligned with these larger societal frameworks, it reinforces students' sense of purpose and responsibility as global citizens. For instance, linking campus initiatives to the SDGs helps students understand the global significance of their actions and motivates them to contribute to collective solutions. This alignment between education and societal goals underscores the interconnected nature of sustainability

challenges and highlights the need for coordinated efforts across different levels of society.

Overall, the results of this review confirm that sustainability education is a powerful driver of change in higher education, capable of shaping both attitudes and behaviors. However, its effectiveness depends on several critical factors, including curriculum design, pedagogical methods, institutional support, peer influence, and contextual relevance. The discussion highlights that while education is essential for building awareness and shaping values, translating these into concrete actions requires enabling environments and supportive structures. Therefore, sustainability education should be viewed not only as a pedagogical tool but also as part of a broader ecosystem that involves institutions, communities, and societies in creating pathways toward sustainable futures.

5. Conclusion

This systematic literature review has examined the relationship between sustainability education, environmental attitudes, and sustainable actions among university students. The results confirm that education for sustainability is not limited to knowledge acquisition but extends to shaping mindsets, attitudes, and practices that are essential for addressing contemporary environmental challenges. By embedding sustainability across curricula and promoting experiential and participatory learning, higher education institutions can effectively nurture students who are not only environmentally aware but also actively engaged in sustainability initiatives. The review also emphasizes that while environmental attitudes provide

the foundation for sustainable behaviors, the translation from awareness to action is influenced by multiple factors, including institutional support, peer influence, and contextual conditions. The persistence of the attitude-behavior gap highlights the necessity for universities to move beyond theoretical instruction and provide practical opportunities, enabling infrastructure, and supportive policies that make sustainable actions more feasible.

Furthermore, the integration of sustainability into interdisciplinary curricula and the alignment with broader societal frameworks, such as the Sustainable Development Goals, enhance the relevance and impact of sustainability education. Nevertheless, challenges remain, particularly regarding the uneven integration of sustainability education across institutions and the contextual differences that shape its outcomes. Addressing these challenges requires a systemic approach, where universities, governments, and communities collaborate to create enabling environments for sustainable practices. In conclusion, sustainability education is a critical instrument for equipping students with the attitudes, skills, and commitments necessary to act as change agents in building sustainable societies. Strengthening its role within higher education is essential for bridging the gap between environmental awareness and tangible, long-term sustainable actions.

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