**Environmental Education: Is It a Crucial Factor in Improving Pro-Environmental Behavior among Students?**

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| **Abstract:** By instructing students on pro-environmental behavior, early environmental education and training can start to establish pro-environmental behavior among student. To proof the value of environmental education in educating students about current environmental issues and their effects on public health and safety, as well as motivating them to adopt pro-environmental behaviors, a literature review is required. The review was based on nine studies from reputable international publications that were published in English between 2019 and 2023 and were selected based on title, population, objectives, and outcomes criteria. The articles were found in the ScienceDirect database. The review focuses mostly on establishing the effectiveness of environmental education in influencing pro-environmental behavior. The review also examines the ways in which students' perceptions of environmental education and their pro-environmental conduct are influenced by the interaction of internal and external influences. The study's findings demonstrate the significance of environmental education in influencing students' pro-environmental behavior. By providing students with reliable, accurate, and valid information, environmental education raises their awareness of environmental issues and promotes the development of pro-environmental behavior. Additional research on best practice design to rise pro-environmental behavior through environmental education can be developed from this study. More research is required on the topic of integrating more both internal and external factors of pro-environmental behavior in the environmental education curriculum.  **Keywords**: environmental education, students, pro-environmental behavior  **Abstrak:** Dengan pembekalan perilaku pro lingkungan pada mahasiswa, pendidikan dan pelatihan lingkungan hidup sejak dini dapat mulai membentuk perilaku pro lingkungan pada mahasiswa. Tinjauan pustaka diperlukan untuk membuktikan peran penting pendidikan lingkungan dalam memberikan wawasan tentang fenomena lingkungan terkini dan dampaknya bagi kesehatan dan keselamatan manusia sehingga meningkatkan motivasi perubahan perilaku pro-lingkungan pada mahasiswa. Tinjauan ini didasarkan pada sebelas penelitian dari publikasi internasional terkemuka yang diterbitkan dalam bahasa Inggris antara tahun 2019 dan 2023 dan dipilih berdasarkan kriteria judul, populasi, tujuan, dan hasil. Artikel-artikel tersebut ditemukan di database ScienceDirect. Tinjauan ini sebagian besar fokus pada penetapan efektivitas pendidikan lingkungan hidup dalam mempengaruhi perilaku pro-lingkungan. Tinjauan ini juga mengkaji bagaimana persepsi siswa terhadap pendidikan lingkungan hidup dan perilaku pro-lingkungan mereka dipengaruhi oleh interaksi pengaruh internal dan eksternal. Temuan penelitian menunjukkan pentingnya pendidikan lingkungan hidup dalam mempengaruhi perilaku pro-lingkungan siswa. Dengan memberikan siswa informasi yang andal, akurat, dan valid, pendidikan lingkungan meningkatkan kesadaran mereka terhadap isu-isu lingkungan dan mendorong pengembangan perilaku pro-lingkungan. Penelitian ini dapat digunakan sebagai pengembangan penelitian selanjutnya tentang desain yang baik untuk meningkatkan perilaku pro-lingkungan melalui pendidikan lingkungan. Topik mengenai elaborasi faktor internal dan eksternal perilaku pro-lingkungan lainnya ke dalam kurikulum pendidikan lingkungan hidup juga perlu ditelaah lebih lanjut.  **Kata kunci**: mahasiswa, pendidikan lingkungan, perilaku pro-lingkungan |  |
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**INTRODUCTION**

Since human activity is at the root of many environmental issues, academics and decision-makers think that encouraging pro-environmental behavior will help to mitigate these issues (Shafiei and Maleksaeidi 2020). In order to avoid more significant risks and harm, pro-environmental behavior includes actions that contribute to the creation of a sustainable environment, such as controlling trash, minimizing energy use, and using public transportation. Since they actively participate in several initiatives that promote pro-environmental behavior and directly contribute to establishing an example for it, they serve as an excellent model of this conduct. Their lifestyle, spending patterns, and educational background set them apart from other young people and influence their pro-environmental behavior (Burlea-Schiopoiu et al. 2021). Because of their level of experience, they also contribute significantly to the efforts that educate their neighbors and family members about the importance of adopting environmentally friendly behaviors. Students are also essential to the promotion of the sustainable development goal since they will be a significant stakeholder group in the society of the future. As a result, a large body of research on pro-environmental behavior includes students identifying the variables that enhance their pro-environmental behavior.

Pro-environmental behavior is influenced by a variety of individual characteristics as well social class, norms, place of residence, sense of responsibility, self-efficacy, knowledge, and education (Gifford and Nilsson 2014). During the decade, many developments have likely occurred, so it is necessary to review the factors that influence recent pro-environmental behavior, especially among students. Fascinatingly, discussions regarding public environmental education indicate that students require this from the very beginning. Early environmental education and training should begin creating these conditions by teaching students how to deal with the environment in a pro-environmental behavior (Robina-Ramírez, Medina Merodio, and McCallum 2020). Moreover, research on ecological behavior has revealed that education may have a significant role in promoting higher levels of information and knowledge. Along with age and gender, education is a significant determinant of general environmental knowledge. Therefore, it is expected that consumers with greater education levels will be more conscious of environmental issues, more worried about the condition of the environment, and more driven to adopt pro-environmental behaviors (Paço and Lavrador 2017). A review is required to condense the main findings from prior research on the subject of environmental education, based on which policy, curriculum, and future studies can be developed.

This literature review was conducted in order to facilitate the subject of environmental education for students keep expanding and enhancing so that its implementation can be more effective (Gifford and Nilsson 2014). Previous literature reviews have covered the development of environmental education curriculum and teaching methodologies as best practices, however they have not addressed the topic of whether or not "environmental education" elements actually affect students' pro-environmental behavior (Cismaru et al. 2011). Thus, the forms of pro-environmental behavior that students engaged in and the primary influencing factors were identified in this study. This study focuses into how effective environmental education is at influencing and strengthening students' pro-environmental behavior, as well as how it relates to other issues. To facilitate the consideration of the methodology by future researchers, the model framework and data analysis techniques from earlier studies are also examined. In order to influence pro-environmental behavior more swiftly, thoroughly, and sustainably, it is intended that the findings of the literature review will offer the most recent explanation about the effectiveness of environmental education and other relevant elements.

**METHOD**

This study examines a number of student actions that support the environment, as well as the methodologies and analytical techniques employed to assess such actions (Concari, Kok, and Martens 2020). The study primarily examines the factors that affect students' pro-environmental behavior, with a particular emphasis on the impact of environmental education. Articles from the ScienceDirect database that were published in English between 2019 and 2023—nine articles selected based on criteria related to title, population, objectives, and outcomes from reputable international publications—formed the basis of the review. Details about the articles utilized in the study is given in Table 1.

The articles that are featured cover a variety of student pro-environmental behaviors throughout multiple nations, rather than just one. Finding the elements that most strongly affect students' pro-environmental behavior is not the goal of the review. The review focuses mainly with determining the effectiveness of environmental education in promoting pro-environmental behavior. The review also looks into how internal and external factors interact to influence students' pro-environmental behavior and how they perceive environmental education.

Table 1. Articles on pro-environmental behavior in students were reviewed

| **Title** | **Pro-environmental behavior type** | **Source** |
| --- | --- | --- |
| Exploring young adult consumers’ sustainable clothing consumption intention-behavior gap: A Behavioral Reasoning Theory perspective | sustainable clothing consumption behavior | (Diddi et al. 2019) |
| Exploring young adults’ e-waste recycling behaviour using an extended theory of planned behaviour model: A cross-cultural study | e-waste recycling behavior | (Kumar 2019) |
| The impact of COVID-19 pandemic on food waste behaviour of young people | food waste behavior | (Burlea-Schiopoiu et al. 2021) |
| Young consumers’ e-waste awareness, consumption, disposal, and recycling behavior: A case study of university students in Sydney, Australia | e-waste management behavior | (Islam, Dias, and Huda 2021) |
| Plastic or not plastic? That’s the problem: analysing the Italian students purchasing behavior of mineral water bottles made with eco-friendly packaging | eco-friendly packaging purchasing behavior | (Galati et al. 2022) |
| Environmental assessment of recycling waste corrugated cartons from online shopping of Chinese university students | waste recycling behavior | (Ma et al. 2022) |
| Water conservation behavior: Exploring the role of social, psychological, and behavioral determinants | water conservation behavior | (Singha et al. 2022) |
| A statistical analysis of recycling attitudes and behaviours towards municipal solid waste management: A case study of the University of Johannesburg, South Africa | solid waste management | (Ayeleru et al. 2023) |
| Digital capability, digital learning, and sustainable behaviour among university students in Taiwan: A comparison design of integrated mediation-moderation models | sustainable behavior | (Liu et al. 2023) |

**RESULT AND DISCUSSION**

A review of 11 articles was categorized according to title characteristics and types of pro-environmental behavior studied, as shown in Figure 1. The topic of water conservation behavior is discussed in an article by Singha et al. (2022); the topic of consumption of eco-friendly products is discussed in two articles by Diddi et al. (2019) and Galati et al. (2022). Waste management behavior is discussed the most in five articles consisting of two articles about electronic waste by Kumar (2019) and Islam, Dias, and Huda (2021); one article on recycling by Ma et al. (2022); one article on general waste management by Ayeleru et al. (2023); and one article discussing food waste by Burlea-Schiopoiu et al. (2021). Sustainable behavior is discussed in two articles by Liu et al. (2023) and Ovais (2023).

Figure 1. Grouping Articles Based on The Title and Discussion Topic; Quantity

The articles that have been grouped are then analyzed to find out the research models, analysis methods, and factors that influence pro-environmental behavior. As known, we grouping the articles into 4 categories, as follows:

**Water conservation behavior**

The article evaluates factors influencing water conservation among students in Japan. A number of variables, including attitudes, emotions, and culture as psychological factors; awareness, responsibility, and personal engagement as social factors; and water use habits as behavioral factors, are tested using the theory of planned behavior and value-belief norm theories. Furthermore, tests were conducted based on age, gender, and religious background. This article According to the theory of planned behavior (TPB), attitudes, subjective norms, and perceived behavioral control all influence a person's intention to engage in a certain behavior. Value-Belief-Norm Theory, which links value theory, norm activation theory, and the belief to originate pro-environmental behavior. The structural equation modeling approach was utilized to evaluate the study hypotheses, while AMOS 24.0 and SPSS 26.0 were employed for data analysis.

The findings showed that water conservation behavior was positively and strongly correlated with emotion, habit, culture, and participation. Gender was the demographic trait that had the biggest impact on behavior; age and religion did not. The understanding of water issues was the most important element in the habit of conserving water. The cost or price of water has a commensurate impact on water-saving practices. Public policies that initiate several educational campaigns or training programs and promote citizen participation in these activities are favorably correlated with water conservation behavior. Utilizing television or other social media platforms to raise environmental awareness about the preservation of natural resources and make the connection between environmental issues and water conservation can either directly or indirectly encourage water conservation behavior.

**Consuming eco-friendly products behavior**

In order to determine the relative importance of factors influencing consumers' decisions to engage in or refrain from engaging in particular eco-friendly consumption, Diddi et al. (2019) applied the behavioral reasoning theory to six distinct focus groups. Next, after reading the transcripts of each focus group, two researchers picked category indicators, gave them names and codes, and then compared the codes to look for patterns. After comparison, selection, and compression of categories into broad thematic areas, an analysis was conducted.

Their dedication to sustainability and their perceived value, which takes into account several elements such as time, money, effort, and product longevity, influence consumer choices. Due to their lack of home economics education, customers need to believe that they are getting the best value possible when it comes to costs, which are a confluence of various aspects (economic, social, and psychological). It pushed for an education on fundamental repair skills to be added to the high school curriculum. Early implementation of structured curricula will enable young individuals to cultivate a "repair mindset," which may ultimately aid in tackling the "disposable culture." Results also point to the preference of younger customers for long-lasting, high-quality clothing over subpar items.

The theories of planned behavior and reasoned action are used in this study to evaluate Italian student purchasing using the cluster analysis methodology. a fuzzy approach adopted to analyze each different cluster (Galati et al., 2022). They reaffirm the applicability of social scientific ideas in the explanation of consumer behavior, particularly the Behavioral Reasoning Theory and the Theory of Reasoned Action. Furthermore, they argue that one of the factors most influencing young people's inclination to buy environmentally friendly packaged goods is pricing, which is refuted. They also show that young Italians who want to embrace environmentally conscious activities are inherently inclined toward this green behavior, as indicated by the study.

It seems very desirable to have communication programs in schools and universities that educate people about the value of choosing recyclable materials and goods and adopting pro-environmental behavior. Consumer education regarding the values, objectives, and advantages of utilizing recycled materials in the context of social and environmental sustainability should be the goal of these communication initiatives. It may be beneficial to collaborate with a social media influencer who enjoys great popularity among young people, as they spend a significant amount of time on social media, where they watch, view, and comment on the influencers' content. Younger generations' lifestyles may be changed, and the environmental stress brought on by the large amounts of plastic that are sold and occasionally thrown out into the environment could be lessened, with the help of effective communication tools.

**Waste management behavior**

In his research, Kumar (2019) highlights the extended TPB and SEM-PLS in China and India. The research findings indicate that attitude (mediated by a sense of duty), subjective norm, perceived control, and individual responsibility are the key elements impacting e-waste recycling intents; in contrast, convenience and consequences awareness constructs showed no significant link. Islam, Dias, and Huda (2021) employed statistical analysis to investigate the awareness and understanding of young consumers regarding e-waste, consumption, and recycling habits. The findings revealed a significant association between the respondents' age, income, and the number of family members residing in their houses. These kinds of advertisements could be created for the target socioeconomic groups (age, income, and size of home) identified by this study.

Burlea-Schiopoiu et al. (2021) also studied food waste management practices in Romania using TPB and SEM-PLS. The results show that the younger generation's ethical attitudes towards food waste, their understanding of the impact of food waste on the environment, their knowledge about food waste, and the influence of COVID-19 all have a positive impact on the younger generation's responsible behavior towards food waste. Youth food purchasing faces the 19th crisis. Even with the initial difficulties caused by the crisis and uncertainty, grocery shopping by the younger generation did not result in food waste. On the other hand, the younger generation is changing their food budgets to minimize food waste. The younger generation's conscientious attitude towards food waste is reinforced by ethical principles and environmental awareness. Therefore, action is needed to improve the attitudes of the next generation. These findings suggest that positive attitudes and actions are strengthened in times of crisis. Lawmakers need to capitalize on this trend and create laws that capitalize on young people's openness to learning new things. The younger generation responsible for food waste bases their attitudes and behavior on their understanding of the causes, manifestations, and impacts of food waste. If conveyed to the younger generation through various means, both formal and informal knowledge can help create awareness about food waste, foster positive attitudes, and influence behavior.

Ma et al. (2022) carried out a unique study that investigated the impact of major, class, gender, and education level on students' recycling behavior using LCA. The highlights of the research are Despite having a high level of education, many students have little understanding of resource conservation, recycling economics, and environmental protection. Education on the detrimental effects of waste corrugated cartons on the environment as well as the advantages recycling waste corrugated cartons has for the economy, society, and environment is a responsibility of both the government and academic institutions. Furthermore, through social media, lectures, and marketing efforts, they should disseminate the concept of environmentally friendly consumption, increase awareness of environmentally friendly packaging, and assist students in creating sustainable lifestyles. Nevertheless, some students might not put in the time and effort because they lack motivation, even when they are aware of how important environmental conservation is. Keeping this in mind, academic institutions might set up systems of rewards and penalties to incentivize students to engage in and contribute to the development of the campus environment, thereby helping to create a green campus.

Students at the University of Johannesburg, South Africa, were selected for this research by Ayeleru et al. (2023). Using logistic regression models, attitudes about the production of municipal garbage were examined, along with perceptions and views. The data were analyzed using exploratory data analysis and the Chi-square test for dependency. The findings demonstrate that educational levels and programs have a big impact on supporter willingness. The motivation to implement waste management is also influenced by the presence of facilities for collecting or disposing of waste in buildings and the assistance of residents who house students.

**Sustainable behavior**

In Taiwan, Liu et al.'s (2023) investigation once more made use of SEM. Innovative capability, big data application, and employability skills are essential traits relating digital capability and sustainable behavior. This study uses the mediation moderation technique to evaluate how digital capability indirectly influences sustainable behavior. Digital capabilities have the potential to modify attitudes towards sustainable behaviour by indirectly impacting sustainable behaviour. Therefore, courses can be created outside of scheduled lectures and can use social media to support and commit to teaching content that combines the concept of environmental protection with marketing strategies in order to enhance students' attention to sustainability and awaken their awareness of environmental sustainability.

**CONCLUSION AND SUGGESTIONS**

The methods and analytical tools used to evaluate various student acts that support the environment are examined in this study, along with the actions themselves. With a focus on the effects of environmental education, the study primarily looks at the variables that influence students' pro-environmental behavior. The review was based on nine studies that were chosen based on parameters pertaining to title, population, objectives, and outcomes from credible international publications. The study's findings suggest that waste management is a key component of the pro-environmental behavior that many students engage in. Students also engage in other pro-environmental practices like conserving water and buying sustainable and eco-friendly goods. Several factors are identified as affecting the pro-environmental behavior of students, including demographic and economic background. Gender, age, religion, income, and size of home affect pro-environmental behavior in different ways. On the other hand, psychological and educational backgrounds also affect pro-environmental behavior.

The theory of planned behavior using structural equation modeling (SEM) or the SEM-PLS analysis approach is the most often utilized model. The study's key finding is that, depending on the theory or model employed for the analysis, a variety of internal and external factors might have an impact on students' pro-environmental behavior. The most significant aspect is that, out of the nine papers, practically all stress the importance of environmental education in influencing students' pro-environmental conduct. Environmental education increases knowledge, awareness, and the desire to manage and create a better environment by providing crucial information about environmental issues, their origins and effects, and the best solutions to overcome them. The term "environmental education" refers to a variety of learning experiences, including traditional classroom instruction, extensive learning through social media or other open media, and non-formal activities. The information that is taught is what makes environmental education so important.

The findings of this study can be used as a foundation for future research to examine the extent to which information variables impact students' pro-environmental behavior as the core of environmental education. Furthermore, it's important to determine the kind of influence the information variable provides—that is, whether it's direct or indirect, significant or insignificant. Providing information on the condition of the environment currently, its harmful effects on humans, and practical solutions to prevent them requires a procedure that encourages responsible decisions in behavior. In order to create innovative instructional techniques and curriculum that satisfy student demands, it is necessary to examine the direct or indirect influence of knowledge. To determine the priority of the type and timing of information to be transmitted, the information's important influence is also examined. This demonstration needs a more thorough statistical analysis, which is not made possible in this study, and is not sufficiently provided by literature reviews.

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