

Sustainability of Protected Environment Through Environmental Education: Perceptions of Teachers and Students at School Level

Urooj Fatima¹, Anila Fatima Shakil² and Rabia Abdul Karim³

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Abstract

Environmental degradation is a significant threat to the entire world, and Pakistan suffers the most from this scenario. This study enlightens aspects that damage the natural environment and affect living organisms. The study primarily aims to discuss the importance of incorporating Environmental Education into the academic system to promote Environmental Sustainability and the benefits a sustained environment provides in return. So, this cross-sectional, mixed-method study accentuates the essentiality of inducting environmental education at the secondary level, because it utilises students' efforts in attaining environmental sustainability. The research sample is secondary schools' (6th – 10th) teachers (100) and students (200). The data is collected through a Likert scale and interview questions, which were analysed using a one-sample t-test on SPSS (Version 20) and thematic analysis, respectively. The analyses of students' data show a computed t-test value of 41.326 compared to a test value of 1.984, indicating their inclination towards the importance of environmental education. Another computed t-test value shows 42.512 against the test value 1.984, which accentuates the importance of a sustained environment for performance enhancement. Teachers are also in favour of inducting environmental education, as it provides a myriad of opportunities to students to act for the attainment of a sustainable environment. Concisely, respondents are interested in inducting and studying environmental education as a separate course, and they also perceive the essentiality of actively working towards the attainment of environmental sustainability and are willing to contribute to this endeavour.

Keywords: Environmental Sustainability, Environmental Education, Secondary Schools, Perceptions, Students and Teachers, Advancements of Performances

Introduction

Numerous factors collectively structure an environment, working together to make the environmental system function and nourish each other. Basically, "environment" is evolved from "environner" – a French origin word meaning "around," and factually meaning "embracing", and this drives towards the connotation of something that comprises all the terrestrial resources and elements, making itself a pedestal for the biosphere to extend. This expands to incorporate all planetary facets affected by various phenomena operating within environmental boundaries. Comprehensively, the environment has a regime over all the abiotic and biotic elements (Anton & Shelton, 2011). Every milieu of the environment holds the right to flourish while sustaining its unharmed state, and this is only possible when the entire environmental condition is stable enough to provide this basic amenity to every aspect. Such a form of environment is perceived as a sustainable form. Sustainability could be described as a state capable of providing resources to the current era and future generations (Perwitasari et

¹Research Scholar, Department of Education – Jinnah University for Women. Email: ujf195@gmail.com

²Professor, Department of Education – Jinnah University for Women. Email: afs28@yahoo.com

³Professor, Department of Education – Jinnah University for Women, Email: drabiakarim@gmail.com



al., 2023). A sustained environment not only ensures the stability of all its components but is also enriched with a significant number of plantations. The role flora plays in human well-being cannot be ruled out. Ecological surroundings directly affect people's physical and mental health, creativity and productivity, develop optimism and also enhance the quality of life. This has been proven by an eight-year-long research study that found a 12% decrease in death rates among people who are constantly in contact with the natural environment (Jimison, 2017).

Reportedly, Earth is the only planet where life exists, whether it is deep down in the waters or up above in the sky (Choi & Harvey, 2022). However, even though it has been in great danger over the past few years and is rapidly degenerating, this is resulting in the rise of many problematic situations; increased deforestation (Suárez et al., 2023), industrialisation, urbanisation (Rupani, 2017; Yadav et al., 2022), contamination of air and water, and noise and terrestrial pollution. Industrial procedures and wastage are rich in heavy metals, carbon-based contaminants, and noxious colors that intensify damage of marine life, flora, fauna, humans, and global warming (Bharti et al., 2013; Singh et al., 2017; & Lasino et al., 2023) – raising sea levels to a count of 3.3mm per year (Ahmed et al., 2022). The Earth's total rotation time has increased, measuring in at 1.59 milliseconds short of the typical 24-hour day, according to the International Earth Rotation and Reference Systems Service. Researchers suggested that this was caused by the melting of gases from Earth, which decreased the weight and resulted in a faster movement around its orbit (Marples, 2022). Increased urbanisation has reduced vegetation spots, resulting in an intensely heated atmosphere that creates the "*Urban Heat Island*" phenomenon (Christen & Vogt, 2004). The Particulate Matter (PM) in the air causes cardiac, skin, and hormonal diseases, immunity problems, ADHD/ADD, cancer, and many other health disorders (Morabet, 2019; Zhao & Cai, 2021), as well as climatic challenges (Manisalidis et al., 2020). The spilling of multiple oil substances and chemicals degrades water quality and marine life. The scattered radioactive substances remain on water surfaces and affect human health as they deposit in bones and cause cancer (Almeda et al., 2014; Obaidy & Lami, 2014; Manisalidis et al., 2020; Speight, 2020).

Pakistan is also facing these challenges, including air and water contamination, deforestation, urbanisation, and industrialisation. Water scarcity and agricultural and food drought are increasing due to industrial and factory effluents being washed into water resources, leading to health issues. Plastic bags being tossed into the waters are affecting marine life. Pakistan is among the top 10 countries affected by the climate-changing catastrophe, which influences health, agriculture, and economic stability. The increased decadence of forests is yet another enormous threat to Pakistan, exacerbated by energy and product shortages, as well as the extensive construction of various projects (Huma, 2018; Khan, 2022). Additionally, many nomadic troops are shackled up everywhere, having no drainage system or civilised culture of living, dumping garbage around the area, and then torching them up. It not only makes the environment polluted but also raises several civic problems.

These circumstances urge practical efforts to secure the environment, as it is the basic amenity for all living organisms. This requires every individual to be attentive to this (Yadav et al., 2022) and highlights the importance of Environmental Education (EE) as EE provides knowledge about people's surroundings and fosters a sense of responsibility towards their environment. Through EE, learners explore environmental problems, seek strategic approaches to solve issues, and bring progressive ecological changes. It systematically develops problem-solving, decision-making, and judgmental skills for environmental preservation and educates people on various environmental aspects and mechanisms, specifically targeting anthropogenic activities detrimental to the environment (Milupi et al., 2023). As mentioned by UNESCO in 1978, and noted in Whitburn et al.'s (2023) work, EE is concerned with improving and sustaining a healthy environment globally. This particular training and education must be administered from the early stages of academic levels, with the most probable level being

secondary. At this stage, students develop several skills and abilities and have a strong instinct for exploring and discovering. Their curiosity, strength, devotion, teamwork, and willingness could play a vital role in sustaining the environment. Educating students about sustainable development methods and appropriate behaviours to protect the environment is an undeniable necessity. To rule in EE, contemplative approaches and all available resources must be utilised because they bridge efficient teaching of EE (Filho & Granvik, 2020).

Literature Review

Environmental Education for Environmental Sustainability

This devouring state of the planet underpins the suffering of humanity, natural surroundings, resources, other living organisms, and everything within the environment. This situation underscores the fundamental importance of Environmental Education for environmental sustainability, ty, which develops the contextual and practical awareness essential to sustain the world (García-González et al., 2020). This concept of harnessing education to save the world and its preservation was also discussed in the Millennium Development Goals, "The Future We Want," and the Agenda for Sustainable Development for the period until 2030 by UNESCO (UNESCO, n.d.; Vorhölter et al., 2025).

Environmental Education Proposes Strategies

UNESCO clearly states that environmental education is essential for preserving the ecological environment, which is healthy for all living organisms. There is a dire need to advance the ecological system to achieve a sustainable and developed natural environment and habitat. EE around the world is considered a thoughtful and organised process, administered efficiently, to reach the implementation phase (UNESCO, n.d.; Shutaleva et al., 2020). The educational sectors are becoming increasingly concerned about teaching environmental education, as it dramatically significantly influences the mitigation of environmental issues and yields several benefits (Wu et al., 2023). EE addresses ecological awareness among students for two primary reasons: first, improper daily human gestures cause pollution, and second, environmental education trains students to address this issue. Secondly, it provides an understanding of ecological facts and concerns. It gives knowledge to people of all ages and educates societies to stabilise and preserve natural resources and the environment (Yadav et al., 2022; Lasino et al., 2023). EE does not only refer to environmental awareness; instead, it is a process of developing a complete personality encompassed by respective attitudes, emotions, behaviours, and thoughtful gestures towards the environment. It opens doors to environmental educational research opportunities, addresses and resolves issues, and proposes appropriate strategic approaches. Students and communities with ecological knowledge value nature more and use their collective efforts to improve the environment (Li, 2018; Suárez et al., 2023). EE utilises pragmatic and theoretical knowledge to address biodiversity and climatic challenges and propels the usage and production of eco-friendly products, and emphasises the necessity of green consumption (Ardoín et al., 2020; Harrison, 2023; Milupi et al., 2023; & Perwitasari et al., 2023).

Environmental Education and Students

Students' behaviours and personalities are developing at the secondary level. They are curious to discover and explore their surroundings and construct their perspectives according to what they experience, observe, and learn (Sass et al., 2021). Their cognitive abilities are progressive; they have fast learning and long-term retention capabilities, and their strong perceptual thinking is associated with elaborating on the connotations of several complex phenomena. They are the change bearers and could develop leadership qualities. These leading instincts help to alter their activities in favour of the environment, and it is time to utilise such potentialities to bring

environmental sustainability (Spira & Baker-Shelley, 2015; Huang et al., 2019). This assistance of students could be significantly enhanced through EE, which constructs and orients their farsightedness and innovative thought process (Ramirez, 2017). EE offers a myriad of methods for developing environmentally friendly skills and capabilities while raising students' awareness of future life situations. This approach instils ownership in students, enabling them to explore and gain more profound and more substantial knowledge of environmental sustainability (Yadav et al., 2022). EE educates on biodiversity and climatic issues, strengthens students' conceptual thinking, offers a broad range of positive behavioural alternatives, directly impacts learners' behaviours, and fosters Accountability and stewardship in students. This gradually makes students cautious and concerned towards the development of a sustainable environment (Rødnes & Dolonen, 2020; Zafar et al., 2020; Biswal et al., 2022; & Guerra et al., 2024).

Environmental Education Integrates with the Impacts of a Sustained Environment

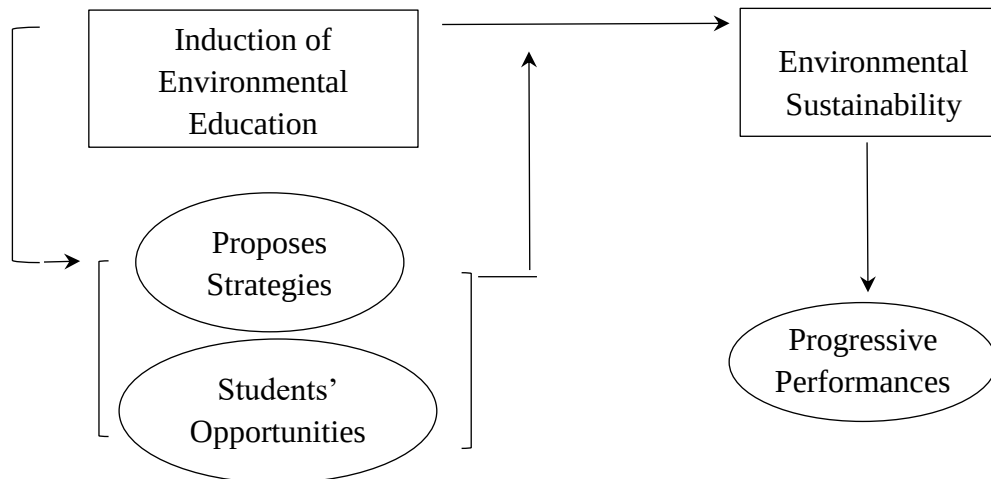
A sustained natural environment is advantageous for the prosperity and stability of human health and surroundings, curbing the threats it faces (Diener & Mudu, 2021). Thickly planted urban areas mitigate air, water, noise, and heat problems, thereby limiting the urban heat island phenomenon by creating shade and cooling effects. Plants' cycle suck up all the pollutants scattered in the air, resulting in a fresh and clear ambience around residential regions (CUBICCON 2021). EE encourages its learners and the general public to interact more with natural environments to lead better living experiences and to provide a quality life (Zafar et al., 2020). Furthermore, it is the most crucial aspect of human lives because EE is directly interlinked with the natural world. It plays a role in mitigating the detrimental socio-economic conditions of people, addressing issues related to society and economics, such as scarcity, racism, and injustice worldwide.

Progressive Performances

Humans naturally admire nature with all its biospheric elements. This is intuitively engraved in humans and termed as '*Biophilia*' in Greek. This driving force is also culturally important and has made its way into many cultural rituals that are being practised even to this day. In primitive times, Europeans had a great deal of foliage around hospitals because of their curative power and speedy remedial effects. Interacting with natural settings improves quality of life, reduces undesirable effects of urbanisation (Krishnan, 2020), and provides a way to socialise, which helps in stress reduction, hence increasing productivity (Kruize et al., 2019). EE offers learners direct exposure to nature through investigatory, pragmatic, project, and problem-oriented approaches, along with nature-connected tasks and activities. These activities enhance student engagement, cognitive skills, intellectual development, skill building, long-term retention of learned experiences, deep connections with nature, self-study behaviours, and students' understanding of nature. (Erhabor & Don, 2016; & Colléony et al., 2019). EE motivates learners to connect with the natural environment because this connection and outdoor activities enhance cognitive performance, develop critical thinking and problem-solving skills, foster leadership qualities, lead to high educational achievements, and improve health states. This interaction with nature also strengthens socialisation, work capability, enthusiasm, and confidence (Ekenga et al., 2019; Gopinath et al., 2023). Having a similar notion, Dale et al. (2020) stated that EE utilises the natural environment as its classroom and connects students with nature. This connection of students with nature increases their productivity, intellectual improvements, and critical analysis. The outdoor interaction nurtures people's sense of Accountability towards the preservation of the environment (Marouli et al., 2018). Evidence of the same is found through experimental research conducted on 50 office employees who were asked to stroll around urban green areas for a straight five weeks. The results were

excellent, and the researchers highlighted favourable health impacts. Participants reported feeling more confident, elated, and enthusiastic about their daily activities (Bang et al., 2016). Looking over all the scenarios and their restorative strategy, this study also aims to promote EE in the educational system of Pakistan right from an early age, and all this could be illustrated in the conceptual framework as:

Figure 1: Conceptual framework



Research Hypotheses

1. Students have perceptions regarding the influence on the development of a sustainable environment through proposed tactics of environmental education.
2. Students have perceptions regarding the effect of the provided opportunities of students on the attainment of a sustainable environment.
3. Students have perceptions regarding the effect of environmental education on the progression of performances of humans by integrating with a sustained environment.

Methodology

This research follows pragmatic research paradigm which undertakes both sides of the realities and believes on the independency of the reality as well as on the conceptual based reality of the phenomenon. Under this paradigm the acquisition of the reality is through measurable and interpretative means. Therefore, this research aims to find the reality behind the attainment of a sustainable environment through environmental education using both philosophies of reality – that is objective and interpretative based reality of the matter. The pragmatic research paradigm proposes the use of mixed method of research that utilizes both a quantitative and qualitative research method. As for the research approach, this research follows deductive approach for the quantitative data and inductive approach is used for the qualitative data.

To conduct this research, cross-sectional survey design was used and the sampling technique was probability sampling under which random sampling was used to draw out the samples. The samples were selected from 43 schools of North Karachi Town, Karachi, Pakistan. The total sample size is 300, whereby 100 teachers and 200 students of secondary level (6th to 10th) were selected.

The quantitative data was collected through the attitude scale, for which the Likert Scale is utilized; comprised of 26 close-ended structured items having five degrees of freedom from strongly agree to strongly disagree (scaling 5 – 1 respectively). The qualitative data was collected through 2 semi-structured interview questions. Quantitative data was collected from

students and qualitative data was collected from teachers through group interviews. These groups were divided into 25 separate groups and each group had 4 participants. The interviews were conducted in 25 sessions – one group per session.

Inferential statistics are used for the analysis of quantitative data where one-sample t-test is run on SPSS (Version 20) to test the hypotheses statistically. The confidence level is kept at 95% which makes the alpha 0.05 and the hypotheses are tested by the tabulated critical value for the two-tailed t-test which is 1.984 and the p-value. The qualitative data is analyzed through thematic analysis as proposed by Braun and Clarke (2006).

Research Analysis and Findings

Quantitative Data

Quantitative data is collected from 200 students of secondary level (6th to 10th) through Likert Scale, comprised of 26 close-ended structured items. Data analysis is done through SPSS (Version 20) where one sample t-test is run to test the hypotheses statistically. The confidence level is 95% which makes the alpha 0.05, and 1.984 is the tabulated critical value of the two-tailed t-test.

Statistical Analyses and Findings of Students' Data

H₀1: Statistically there is no significant difference in the perceptions of students regarding the influences of proposed tactics of environmental education on the development of a sustainable environment.

Table 1: EEPAT (Environmental Education Proposes Actable Tactics)

One-Sample Test						
Test Value = 1.984						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
EEPAT	41.326	199	.000	14.366	13.68	15.05

H₀: $\mu=0$

α : 0.05

The p-value is .000 < 0.05, thus rejecting the null hypothesis.

The tabulated critical value of the two-tailed t-test is 1.984

Reading of the t-test is 41.326 > 1.984, thus rejecting the null hypothesis upon alternative.

H_a: $\mu \neq 0$

H₀2: Statistically there is no significant difference in the perceptions of students regarding the effects of the provided opportunities of students on the attainment of a sustainable environment.

Table 2: SOFEP (Students' Opportunities for Environmental Protection)

One-Sample Test						
Test Value = 1.984						
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
SOFEP	41.370	199	.000	14.376	13.69	15.06

H₀: $\mu=0$

α : 0.05

The p-value is .000 < 0.05, thus rejecting the null hypothesis.

The tabulated critical value of the two-tailed t-test is 1.984

Reading of the t-test is $41.370 > 1.984$, thus rejecting the null hypothesis upon alternative.

$H_a: \mu \neq 0$

H_03 : Statistically there is no significant difference in the perceptions of students regarding the influences of environmental education on the progression of performances of humans by integrating with a sustained environment.

Table 3: SEAPP (Sustainable Environment and Progressive Performance)

One-Sample Test

	Test Value = 1.984					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
SEAPP	42.512	199	.000	18.466	17.61	19.32

$H_0: \mu = 0$

$\alpha: 0.05$

The p-value is $.000 < 0.05$, thus rejecting the null hypothesis.

The tabulated critical value of the two-tailed t-test is 1.984

Reading of the t-test is $42.512 > 1.984$, thus rejecting the null hypothesis upon alternative.

$H_a: \mu \neq 0$

Qualitative Data

Qualitative data is collected from 100 teachers of secondary level (6th to 10th) through 2 semi-structured interview questions. Data analysis is done through thematic analysis as proposed by Braun and Clarke (2006).

Thematic Analyses and Findings of Teachers' Data

The interview questions have two major sections and two themes in total. The first section aims to investigate the essentiality of EE for environmental sustainability and has one theme. The second section targets the interrelatedness of EE with the natural environment to privilege individuals' performance outcomes in their respective fields, and has one theme.

Section I: How would EE be sufficient for environmental sustainability?

Theme I: Environmental Education and Restorative Strategies

Respondents perceive that having EE as a separate course at the secondary level would help to attain a sustained environment. According to their perception, EE would provide the necessary information required for students to know about different phenomena in nature. They believe that dedicating a slot solely to environmental education is just as important as other subjects, where students would dedicate their time to understanding the environment. Further, it would also educate students about the factors contributing to the decline of the natural world and the consequences of this decline. Respondents think that EE would educate about an array of probable strategies that would be sufficient to attain environmental sustainability. It would elaborate on the significance of plantations in preventing environmental toxicity and providing a fresh atmosphere. It would explain appropriate ways to dump waste materials. EE would also elucidate constructs for the eco-friendly system and explain the importance of students' roles in conserving the environment. Respondents also think that if EE is provided pragmatically, it would practically involve students in environmental activities that would not just increase their knowledge and bring them closer to nature, but would also develop in them the enthusiasm to

work for the preservation of nature, because students like to get engaged in the tasks that are self-driven and require their perceptions and efforts.

Section II: How EE could integrate the benefits of a naturally sustained environment to enhance individuals' performances?

Theme II: Impeccable Performance Outcomes

Respondents believe that EE and the natural environment contribute to the precision and enhancement of daily activities and work attitudes in their respective fields, including those of students. Societies are increasingly becoming fast-paced and have high expectations. Parents also pressure their children to score high grades, which results in less attention to their basic psychological, biological, and behavioural needs. People, including students, office employees, teaching staff, administrative personnel, and even those working from home, are increasingly becoming frustrated and agitated due to their respective problems, completely ignoring the quality of their lives. In this situation, being aware of the importance of spending time in the natural environment would be beneficial for them. Through EE, teachers and students could engage with natural settings by participating in nature-based activities that would naturally unwind them and make them calm and content. This would significantly enhance their potential in their respective fields of work. It will also help them focus on their work, assist in their higher educational achievements, and enhance their problem-solving, decision-making, and analytical skills. EE could also provide field trips to naturally sustained places to educate and strengthen motivation towards work to improve performance. Spending time outside would refresh the brain, and people would be self-motivated, helping them accelerate in their respective fields and produce impressive outcomes.

Discussion

The interpreted results showed that students and teachers perceive the significance of EE as it brings progressive changes to the world, enhances the quality of life, and yields better performance outcomes. It is a pathway to achieving a sustainable environment with the potential and assertive efforts of students. EE reforms their behavioural and thinking patterns to favour the environment. It also offers a myriad of resources and several pedagogical methods to choose from for a more effective and efficient delivery of environmental knowledge and awareness. Students strongly perceive EE as a better option because it offers them numerous opportunities and information, enabling them to work for the betterment of the environment. Additionally, EE is seen as a holistic program that offers both conceptual and practical knowledge. Respondents also believe that an ecologically sustainable environment enhances individuals' creativity, productivity, and capabilities, and strengthens their focus on their respective work. They perceive that when students interact with the natural environment, it enhances their problem-solving, decision-making, and analytical skills. These interactions are facilitated through EE, which aligns with the natural environment by organising nature-based study programs and tasks. Evidentially, the findings are also aligned with the studies of Huang et al. (2019); Shutaleva et al. (2020); and Whitburn et al. (2023), who also emphasised the essentiality of EE and the individual and joint ventures of students with their peers to preserve the environment, provided with a practical approach. Mentioning further, teachers suggested that planting around the school area would enhance the health status of teachers, students, and other personnel of the institute.

Conclusion

This study aims to inform that plantations and a sustainable environment benefit humanity and other living organisms, and the sustainability of the environment could be achieved through environmental education. This education manifests in various ways to harness students' efforts

to preserve the environment. Consequently, the interpreted data exposed that teachers and students have stable opinions regarding the scenario. They strongly believe in the essential role of EE in achieving a sustainable environment and the advancements and benefits that accompany it. Further, they also have the willingness for the induction of EE in the academic system as it acknowledges the gap in the system regarding the education for the environment and removes this gap with its holistic approach and brings out the respective behaviours and attitudes of students to volunteer individually and collaboratively for restoring and preserving the sustainable environment, to get boundless prosperity that it offers. Subsequently, the conducted research did not find implemented initiatives for EE in secondary schools and showed a dire need for environmental knowledge to be incorporated into the system. Therefore, this study suggests the induction of environmental education in the educational system, designing training programs, seminars, and workshops to train teachers regarding appropriate strategies for the teaching of this course, and the timely organisation of field trips for students to the botanical and horticultural gardens to develop their understanding of the natural environment efficiently.

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