

# Exploring Environmental Education Content and Pedagogical Skills for Trainee Teachers: A Study on Ecological Literacy, Environmental Issues, and Practical Teaching Approaches

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**How to cite this paper:** Ishaque, B., Paul, I. A., & Fatima, H. (2025). Exploring Environmental Education Content and Pedagogical Skills for Trainee Teachers: A Study on Ecological Literacy, Environmental Issues, and Practical Teaching Approaches. *Open Journal of Social Sciences*, 13, 154-174. <https://doi.org/10.4236/jss.2025.131009>

**Received:** December 10, 2024

**Accepted:** January 12, 2025

**Published:** January 15, 2025

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## Abstract

This study explores the extent to which environmental education content and pedagogical skills are incorporated into teacher training programs, focusing on ecological literacy, understanding of environmental issues, and practical teaching methods. Through directed content analysis of the B.Ed. curriculum based on frameworks from UNESCO and similar bodies, the research reveals that while the curriculum covers basic instructional strategies, it lacks practical approaches to environmental education and community-based engagement. The literature discussed the Environmental Education, SDGs, environmental conditions, sustainable education and their associations with one another. In achieving the goal of the research, the researcher had employed Qualitative research. Content Analysis research design was used. The study concludes that future educators require a more holistic curriculum that emphasizes critical thinking, community involvement, and sustainable practices, equipping them to effectively address environmental challenges and promote ecological awareness within their teaching. Recommendations call for enhancing the curriculum with practical applications to foster both ecological literacy and sustainable practices among trainee teachers.

## Keywords

Environmental Education, Ecological Literacy, Pedagogical Skills, Teacher Training, Sustainable Teaching Practices

## 1. Introduction

The higher education has entered a period of transition after evolving slowly since a long time. Such progress in education system requires changes in the educational policies, curriculum, and teachers' training programs, which demand regular revisions after critical analysis to fulfill the needs of the changing world (Tran Ho, Lepage, & Fang, 2023). The role of teacher is to address many complex issues related to the society, culture, technology advancement, and various other factors affecting our lives. Teachers must be equipped with the required professional skills and knowledge to effectively teach the content and the pedagogical approaches as guided by the policies (Fonsén & Ukkonen-Mikkola, 2019).

Pakistan is facing serious health issues from the persistent neglect of the environmental challenges, including air and water pollution, scarcity of water, misuse of natural items, lack of awareness of the citizens about the environmental conditions and how to reverse the situation through individual efforts by making small changes in daily life practices (Sultan, Ahmed, & Imran, 2020). Therefore, a continuous awareness about recycling, eco-system, climate change, waste management and environmental degradation is the need of time, and this must be started from the early years when the habits and beliefs are being formed and continue throughout the life.

The economy and society flourish in healthy environment (Damoah & Omodan, 2023). The Environmental literacy becomes crucial as the planet's health is deteriorating (Tran Ho, Lepage, & Fang, 2023); Therefore, Environmental Education is needed to provide the methods and content which develop critical thinking, questioning attitude towards environmental issues, analysis and interpreting skills, understanding of ecosystem and environmental processes, and train for personal and civic responsibility (Franzen, 2018).

“Environmental education (EE) is a process that helps individuals, communities, and organizations learn more about the environment, develop skills to investigate their environment and to make intelligent, informed decisions about how they can help and take care of it.” (About-EE-and-Why-It-Matters, 2021).

## 2. Statement of the Problem

The current elementary-level curriculum aims to provide learners with knowledge about the natural environment and raise awareness of environmental issues impacting life on Earth. While students are introduced to topics that shape their understanding of environmental challenges, the existing curriculum often lacks emphasis on practical skills and actionable knowledge. There is a gap in preparing students to engage critically and responsibly with environmental problems.

To address these gaps, it is essential to equip teachers with relevant skills and training to deliver environmental education that fosters critical thinking, moral reasoning, and proactive behavior among children. Teacher education programs must revise their curricula to align with the current societal and environmental needs. This includes integrating strategies that not only ensure sustainable

development but also prepare teachers to facilitate meaningful learning experiences that promote a deeper understanding of environmental responsibility. Colleges, universities, and schools must collaborate to produce educators who can effectively bridge these curricular gaps and contribute to building a sustainable future (Franzen, 2018).

### 3. Research Objectives

1) To identify the content or topics being taught to trainee teachers to provide them the knowledge needed to teach the environmental topics, covering the ecological literacy, environmental issues, and environmental practical solutions.

2) To explore the different pedagogical skills being given to trainee teachers for teaching, which includes planning, implementing, creating environment, curriculum designing, assessing and evaluation.

### 4. Research Questions

This study is guided by the following research questions:

1) What topics or content are being taught to trainee teachers to provide them with the knowledge needed to teach the environmental topics?

2) What are the different pedagogical skills being given to trainee teachers for teaching?

### 5. Significance of the Study

Elementary teacher education program was chosen for this content analysis because this is the age when critical thinking, behavior change, attitude and values formation, and reasoning between right and wrong is quite strong and children at this stage prefer to reason and draw conclusion which impact their beliefs and behavior (Cristóvão, Candeias, & Verdasca, 2020). (The reason for fourth grade material being evaluated more often in the literature is presumably that this age is a pivotal point in the cognitive development of children (Lettau, 2021).

UN General Assembly reiterates that Education for sustainable development ESD is the global framework for achieving the SDGs by 2030. ESD develops the competencies in cognitive, socio-emotional, and behavioral dimensions of the learner which helps not only the individuals to be successful but also to be able to prosper collectively as a global community (UN General Assembly, 2017).

### 6. Literature Review

#### 6.1. Natural Environmental Conditions

The surrounding environmental conditions and climate change are posing great threat to the life on earth. The damage is done by human beings by disrupting the balance of nature due to industrialization and unhealthy scientific advancement, which ignore the role of natural surroundings and finally facing the challenges of environmental degradation (Damoah & Omodan, 2023). To rectify this blunder caused by humans, we need to inculcate the love and care for the environment

within young children (Barrable, 2019). The critical global issues were mainly due to the enormous poverty of the South and the non-sustainable pattern of consumption and production of North (UN, 1987).

Since few decades education systems around the world have included environmental education in higher grades, conduct debate sessions, start volunteer support network and awareness campaign (Tran Ho, Lepage, & Fang, 2023). All these make an impact, but not that considerably enough, which was needed. The EE can be the solution to the problem as EE is a process that helps to develop the ethics and skills essential to recognize the relationship between humans and the environment. The goal is to resolve and avoid environmental problems by preparing citizens, including students (Febriasari & Supriatna, 2017). Environmental Education is important to gain considerable attention in building up a sustainable environment. The achievement of EE can be assessed through environmental literacy of the students. The expected outcome of environmentally responsible behavior can be expected from honorable communities that have environmental literacy. In other words, citizens, including students having environmental literacy will behave responsibly to the environment through awareness of environmental issues (Spínola, 2021).

## 6.2. Environmental Education (EE)

“Environmental Education is a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. As a result, individuals develop a deeper realization of environmental issues and have the skills to make informed and responsible decisions” (EPA, 2021).

The United Nation Decade of Education for Sustainable Development from 2005-2014, supported the utilization of educational resources of the world for creating a more sustainable future. Sustainable future cannot be achieved alone through education reform; still, without taking help from education and learning for sustainable development we will not be able to achieve the goals (UNESCO, 2007). The overall purpose of the UN (DESD) was to integrate the principles, values, and practices of SD into all aspects of education and learning. This educational shift encouraged changes in behavior that support more sustainable future in terms of environmental integrity, economic viability and a just society for present and future generation (Buckler & Creech, 2014). Many segments of the education community evaluated their efforts and lessons learned during those ten years. That served as a foundation for expanding and scaling up ESD in teacher education programs during the global Action Programme (GAP) on ESD in the post-Decade period. The Global Action Programme (GAP) on ESD, which ran from 2015 to 2019, intended to produce and increase ESD to accelerate progress towards sustainable development.

The main goal of Sustainable Development is fostering the well-being and improving the lives of the people worldwide in the present space and time while protecting the natural resources and biodiversity for future generation (Saqib *et al.*, 2020).

Education for Sustainable development commits to achieve sustainable development in its three dimensions; economic, social, and environmental in a balanced and integrated manner (UN General Assembly, 2017).

### 6.3. Relationship between Environmental Education and ESD

The environment and developmental issues are interlinked, so dealing them separately would never be fruitful. According to the World Commission for Environmental Education, environment and development are not separate challenges, development cannot be sustainable in a deteriorating environment nor environment can be protected if development is left unaccountable at the cost of environmental destruction. Such complex issues cannot be treated in fragments by different institutions and policies (Nousheen, Zia, & Waseem, 2024). As they both are linked in a system of cause and effect, therefore, WCED argued to consider the relationship between ecological, economic, social, and technological issues, WECD called this Sustainable Development. In order to improve the quality of life on earth while ensuring the safeguard of life supporting system upon which all life depends is the goal of Sustainable Development (Report of the World Commission on Environment Development, 1987; Richter & De Sousa, 2019).

The terms Environmental Education and Environmental Education for Sustainable Development are often used interchangeably, however, it is noted that the term ESD is used more often at the international level and within United Nations documents (Fucsko & Sax, 2019). ESD is mainly seen to renew education and curriculum, including teaching learning content, processes, and applications. But the reality is that ESD is making insignificant contribution if it is considered as a separate and distinct entity.

The Belgrade Charter 1975 clearly stated EE within an ethical and political framework, which would facilitate change leading to an equitable distribution of the earth's resources and more fairly fulfilling the needs of all people. Its emphasis on socio-ecological relationships through clearly explains such concepts as "quality of life" and "human happiness" (Hume & Barry, 2015).

### 6.4. SDGs and Environmental Education

The purpose of SDG is to safeguard sustainable, prosperous, peaceful and equitable life on Earth for everyone along with the protection of systems supporting life on Earth for now and for the future. The goals attend the challenges that are crucial for the survival of humanity and set limits to the use of natural resources. It has a holistic approach and cover a range of social needs, including poverty, education, health, social protection, economic development, climate change, and environmental protection (UN, 2015).

EE focus on sustainable future for all, which guides individuals and institutes towards social and environmental protection and development (Damoah & Omodan, 2023). EE through SDG engages students to investigate on ensuring environmental quality, social equity, and economic prosperity (NAAEE, Environmental

Education Materials, 2021).

### 6.5. Priority Action Areas for Sustainable Education

To bring positive change GP has identified five areas of action to advance the ESD agenda. 1) advancing policy, 2) Transforming learning and training environments by integrating sustainability principles into education and trainings, 3) building capacities of educators, 4) empowering and mobilizing youth and (5) accelerating sustainable solutions at local level (UNESCO roadmap for implementing the Global Action Programme on Education for Sustainable Education, 2014) (UNESCO, 2019, Framework for the implementation of Education for Sustainable Development (ESD) beyond 2019). All these priority areas are directly or indirectly related to preparing and training teachers for achieving the goals of sustainable Environment.

### 6.6. Competencies Developed through EE

Environmental Education (EE) offers the methods and content that can enhance the environmental literacy and a more sustainable future. Through EE, people develop questioning, interpersonal skills, analysis and critical thinking, knowledge of environmental processes and civic responsibility (Nousheen, Zia, & Waseem, 2024).

Environmental Education develops an environmental literate citizen who makes choices that are healthy for the environment, leading to a more sustainable planet. EE has other benefits including the use of environment for improving test scores, learning engagement and teacher satisfaction. Further health benefits both physical and emotional can be gain by spending time outdoor in nature (Franzen, 2018).

NAAEE (Guidelines for Excellence Professional Development of Environmental Educators, 2020) developed a set of standards for educating environmental educators. It recommends that trainee teachers learn about the nature of EE, develop environmental literacy, learn about integrating environmental education into school curricula and in assessment practices and further continue the professional development in this area. These have been developed by NAAEE in 2007 which included a comprehensive list of themes and competencies for professional environmental educators.

Later, in 2010, NAAEE (Tilbury, 2011) developed guidelines by creating a set of competencies needed by educators to implement ESD. The list identifies four areas of competency; learning to know, learning to do, learning to be and learning to live together. This was applied to three strategies, which are holistic approach, envisioning change and achieving transformation.

The Alberta Council for Environmental Education (ACEE, 2021) has offered its own set of competencies for students of environmental education; while intended for K-12 students, the proposed competencies are suitable for teacher candidates as

well. It also proposes that students should have a positive relationship with the natural world, an inner desire to make the world a better place, learn by engaging in real world collaborative projects, and be active citizens. It further notes that teachers and students must develop the skills to foster critical thinking, address environmental challenges, and take responsible action. The document mainly highlights the importance of teachers as co-learners, researchers, and role models, with an understanding that their actions have an impact on the learning that occurs.

### 6.7. Review of Research Studies Conducted in the International Context

This section reviews the findings of the study conducted in the international context to explore. A review of these studies is presented below in **Table 1**.

**Table 1.** A summary table for international research studies.

Authors	Aim	Research methods	Participants, sample selection	Setting	Major Findings
Sukma et al., 2020	It aims to determine the opinions and knowledge of teachers regarding the integration of environmental education in the elementary schools.	Survey Method	Elementary grade teachers (n = 128)	Community (rural and urban West Sumatra) Indonesia	The result showed that most of the teachers agreed upon the importance of integration of EE in the elementary grade schools.
Ergin (2019)	The aim of this research was to determine the environmental awareness of teacher candidates.	Survey Method	Trainee Teacher (n = 532)	Trakya University (Edirne) Turkey	It was found that the Environmental awareness of the candidate teachers was very high.
Franzen (2018)	The aim is to find out the teaching method and assessment method for EE practices.	Survey Method	Most knowledgeable Faculty on EE from Institute offering ETEP from 4 States of US (n = 66)	Colleges & universities with ETEPs in Illinois, Iowa, Minnesota, & Wisconsin	The results imply that the faculty members are completely including EE but still there are gaps in meeting the competencies in EE.
	The aim was to study the sustainability pedagogies in initial teacher education.	Content Analysis	Research Articles (n = 17)	Peer reviewed published articles in English on the initial Teacher preparation for EE.	The findings propose that factors that impact student teacher learning for sustainability require in-depth exploration to draw reliable conclusions and inform pedagogical decisions that can best support the development of prospective teachers' understanding, thinking and ability to employ sustainability.

**Continued**

Martha C. Monroe, Richard R. Plate, Annie Oxarart, Alison Bowers & Willandia A. Chaves	Focusing on teaching strategies for climate change education.	Content Analysis	Articles having climate change education teaching strategies (n = 49)	Articles on assessment of climate change in EBSCO host database.	Personal relevance and active teaching as the main teaching strategies, which include, discussion, project involvement, addressing misconception and meeting experts are the most helpful teaching strategies.
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### 6.8. Review of Research Studies Conducted in the Pakistani Context

This section reviews the findings of the study conducted in the Pakistani context to explore... Searches in the local databases...yielded...studies. A review of these studies is presented in **Table 2** below.

**Table 2.** A summary table for research studies in the Pakistani context.

Authors	Aim	Research methods	Participants, sample selection	Setting	Major Findings
Sohaib Sultan, Muhammad Ajmal and Muhammad Farouq Lodhi	To assess the perception of trainee teachers towards Environmental Awareness at tertiary level of education in Pakistan and to compare the performance of control and experimental groups of teachers on Environmental	Mix method: survey and experimental.	Trainee Teachers (n= 60)	Federal College of Education (Islamabad) Pakistan	It was found that level of Environmental Awareness was very high in the results of Post Test as compared to Pre-Test results.
Rose et al. (2014); Franzen (2018)	Awareness at Tertiary Level. To explore the inclusion of environmental education in the curriculum at elementary and secondary levels of Khyber Pakhtunkhwa province of Pakistan.	Content analysis of textbooks	All course books from grade 6 to 10.	Government books (KPK) Pakistan	Although considerable quantity of environmental education had been included to address the national and international challenges but there is lack of coherence in subject matter. One common observation in all textbooks is lack of practical involvement of students in all those propositions.

## 7. Research Methodology

In achieving the goal of the research, the researcher had employed Qualitative research. Content Analysis research design was used, it is a research method which can be used to determine the existence of certain concepts within sets of texts in order that the trend or occurrence of that concept becomes apparent (Colorado State University, 2016). After knowing the trends, it can be used to evaluate and for future planning and research. Rose, Spinks and Canhoto (Rose, Spinks, & Canhoto, 2015) state that the content analysis focuses on findings of both nature, that is manifest and the latent content of the data. Manifest content refers to the categories in a text which can be counted and clearly seen, therefore, it deals with the numerical based summary and does quantitative content analysis. While the latent content analysis is discovering the meaning behind the manifest content, so it deals with descriptive analysis and interpretation is required, which makes the latent content analysis a qualitative method of research. Qualitative content analysis emphasizes its focus on text interpretation. And the same approach of latent content analyze was employed in this study as the researcher wanted to provide richer findings.

There are three different approaches to content analysis: conventional, directed, and summative. All these three approaches are used to interpret meaning from the content or text data. Directed content analysis is a deductive approach to qualitative analysis which starts with an existing theory or framework and utilizes data to either support or construct upon that framework. The results of the content analysis using qualitative technique provided the current position for the investigation of the curriculum about Environmental Education. The researcher uses the directed content analysis method with manifest and the latent content so the researcher can analyze deeper and interpret in detail.

To sum up, it can be stated that these two techniques, both latent and manifest analysis are appropriate to be employed together in this study. They enable the researcher to examine the large number of data systematically and then describe the results of the analysis, including the interpretation to grasp the meaning. Hence, the components of EE in the curriculum of teacher education program can be best presented through this research method.

## 8. Research Design

The current study is a qualitative study using a directed content analysis research design.

### 8.1. Research Context

The research study analyzed the Curriculum of B.Ed. Elementary degree program by HEC.

### 8.2. Sampling, and Document Inclusion Criteria

The purposive sample, utilizing a criterion sampling technique, was selected by

the researcher. Purposive sampling, also known as judgmental sampling or subjective sampling, is a nonprobability sampling technique where the researcher depends on their discretion to choose sample from the population. This helps the researcher to filter out irrelevant data that do not fit into the context of the study (Bernard, 2002).

The criterion sampling is a type of purposive sampling, it is a method of selecting sample based on certain criteria. Criterion sampling involves the selection of sample based on some pre-established criteria. This criterion is of importance to the research in significant way. This type of sampling helps to study a very specific or narrow criteria and understand the implications of it. This enables to study the content in depth and with emphasis (Patton, 2001; Denieffe, 2020).

The following criteria were used to decide the inclusion of curriculum documents in this study:

- 1) The curriculum is used currently.
- 2) The curriculum is accepted and designed by educationalists.
- 3) The curriculum of teacher education for level in which the foundation of learning is formed.
- 4) The curriculum for the teacher's preparation for elementary level was studied as the beliefs and habits are formed at this stage.
- 5) Curriculum for Teachers for age level when the thinking, logical reasoning, critical analysis, and abstract ideas can be easily formed.
- 6) Local curriculum.
- 7) Curriculum implemented nationwide and given by the HEC, govt. organization.
- 8) Curriculum which is assessable.

### **8.3. Data Collection Method**

Data are considered as one of the essential components in research. Data can be defined as a kind of information which researchers obtain about their research to answer the research question. In this study, the data is qualitative in nature. The qualitative data were gathered to find underlying meaning of the analysis results. The nature of such data is direct observation.

The data was selected through purposive criterion sampling, the B.Ed. Elementary Curriculum by HEC. Duncan developed the nine-step procedure for content analysis in 1989.

### **8.4. Data Analysis Methods**

In this study, the curriculum document is searched through website, then the unit of analysis was decided, and initial codes were developed after extensive research of relevant documents. The codes were searched in fixit pdf reader software. The details of the terms found in the curriculum were saved for in depth understanding. Hence, directed content analysis method was used in this study. This means the theory and established framework for environmental education for teacher

education was extracted after thorough analysis from various documents and then those were converted into codes for word search of the curriculum of B.Ed. Elementary. Then each word found has been analysed by the researcher by reading the content of the curriculum in detail, and then record the number of times the codes has been repeated in the document, with the details of semester, course name, unit and further teaching and conceptual details. Finally, the codes were grouped into themes to make the data manageable and understandable.

## 9. Findings

In this study, a content analysis design is used. The analysis required comparisons across multiple cases (curriculum) in order to develop a better understanding of the essential components for teaching Environmental Education at the elementary level. Below are the main themes and sub-themes analyzed from the data collected. The main two themes for the curriculum analysis after extensive literature reviews are:

Theme one: Ecological Literacy.

Theme two: Planning and Implementing Environmental Education.

### 9.1. Theme One: Ecological Literacy

The theme Ecological Literacy is further divided into three subthemes of cognitive dimension, social-emotional dimension, and behavioral dimension. The cognitive dimension includes knowledge and critical thinking skills essential for understanding the complexities of the world. The social and emotional dimension includes skills, attitudes, and values to understand the environmental issues so later they will be able to act for the solution. The behavioral dimension foster compassion, respect, and peaceful ways within the learners to build harmonious relationships with others. It also develops the ability to involve in constructive participation within the community (local or global) and promote sustainable environmental development. Ultimately, the behavioral dimensions facilitate learners in the application of societal standards which supports environmental sustainability.

#### Sub-theme 1: Cognitive Dimension

Cognitive Dimension of Ecological Literacy includes various aspects, so it is further divided into three, Ecological Content Knowledge, Environmental Issues, and Environmental Solutions.

##### a) Ecological Content Knowledge

Terms finalize for Ecological content Knowledge. **Table 3** shows more detail of this theme.

- 1) Environment/sustainable.
- 2) Earth physical system/land formation/climate.
- 3) Climate change.
- 4) Ecosystem/Life on Earth/Human System/Human Environment Interaction/Society/Economy/Industry.
- 5) Human survival and well-being.
- 6) Personal & civic responsibility.

**Table 3.** Sub-Theme 1a: ecological content knowledge.

S. No.	Theme	Status	semester	course	Unit
1	Environment/ sustainable	Mentioned	3	Social studies	Unit 3: 2 weeks: Geography—People, Place and Environment
			2	Pakistan Studies	Unit 2: Land & People Week 5; physical features Week 6: climate and its factors Week 6: environmental Problems: natural and human made disaster Week 7: human environment interaction
2	Earth Physical Systems	Mentioned	4	Teaching Social Studies	Unit 3: Geography—People, Place & Environment, week 7: definition & rationale for teaching and learning geography
			1	Science 1	Unit 4: Earth—The Blue Planet, week 8 & 9: physical features, climate, constant change on Earth.
3	Climate change	Mentioned	2	Science 2	Unit 4: 3 weeks: Earth’s Systems Undergoing Constant Change
4	Human survival and well being	Not Mentioned			
5	Ecosystem/life on Earth/ human environment interaction	Mentioned	4	Teaching of social studies	unit 3: Geography, people, place & environment. week Human and environmental interaction
			1	Science 1	Unit 2: 3 weeks: Population & Ecosystem Unit 3: Diversity & Adaptation
			2	Science 2	Unit 5: solar system and the universe
6	Personal and civic responsibility	Not Mentioned			

Among the subthemes, the Earth Physical systems and ecosystem was covered comparatively in detail while human survival and well-being and personal and civic responsibility are not covered from Environmental perspective.

#### **b) Environmental Issues**

Terms finalize for Environmental issues, **Table 4** shows more detail of this theme

- 1) Global warming.
- 2) Resource distribution and consumption.
- 3) Greenhouse effect.
- 4) Pollution.
- 5) Ozone layer.
- 6) Acid Rain.
- 7) Deforestation/loss of forest/tree cutting.

**Table 4.** Sub-theme 1b: Environmental Issues.

S.No.	Theme	Status	semester	course	Unit
1	Global Warming	Mentioned	4	Teaching social studies	Unit 3: week8: global warming
2	Resource Distribution	Not mentioned			
3	Green House Effect	Not mentioned			
4	Pollution	Not Mentioned			
5	Ozone layer	Not mentioned			
6	Acid Rain	Not mentioned			
7	Deforestation	Not Mentioned			

The B.Ed. curriculum for elementary teachers doesn't include any of the major issues on Environmental problems except global warming for 1 week. This clearly focus light on how some of the major topics are totally ignored, which shows environmental education was not taken into consideration before planning and developing the curriculum.

### c) Environmental Solutions

Terms finalize for Environmental Solution. **Table 5** shows more detail of this theme

- 1) Recycling/renewable/reusable.
- 2) Green Economy/Economic development/Sustainable Industry/responsible consumption & production.
- 3) Natural resource management, Energy and water Transformation, and conservation.
- 4) Environmental protection/Climate Action.
- 5) Urban and rural development/Sustainable Cities & Communities.
- 6) Cooperate responsibility/Partnership for sustainable development.
- 7) Clean Water & Sanitation.
- 8) Affordable & Clean Energy.

**Table 5.** Sub-theme 1c: Environmental Solutions.

S.No.	Sub-themes	Status	semester	course	Unit
1	Clean Water & Sanitation	Not mentioned			
2	Affordable & Clean Energy	Not mentioned			
3	Natural Resource Management	Mentioned	3	Science 2	2 (Energy Transformations & Conservation)
4	Sustainable Cities & Communities	Not mentioned			
5	Sustainable consumption & Production	mentioned	4	Teaching of social studies	Unit 6: production, distribution and consumption (not related to environment)
6	Climate Action	Not Mentioned			
7	Partnership for Sustainable Development	No Mentioned			

**Sub-Theme Two: Social & Emotional Dimensions:**

Teaching must assist in achieving these competencies within students. 21st century Competencies for students enable learners to collaborate, negotiate, create, and communicate in a diverse and globalized world, further fight back with the life and work challenges of 21st century. Self-reflection is also developed by focusing on social emotional dimensions of oneself, as well as values, beliefs and attitudes that assist the learners to lead a fulfilling and productive lives, with peace and in harmony with others. **Table 6** represents a detail picture of the current sub-theme.

**Table 6.** Sub-theme 2: Social and Emotional Dimension.

S. No.	Sub-Themes	In curriculum	semester	course	Unit
1	Creative thinking	Not mentioned			
2	Critical Thinking	Not Mentioned			
3	Communication	Not Mentioned			
4	Collaboration & Cooperation	Mentioned	3	ICT in Education	Unit-4: ICTs for Life-long Learning and Teacher Professional Development (2 weeks - 4 hours)
5	Conflict Management	Not Mentioned			
6	Self-Responsibility	Not Mentioned			
7	Decision Making	Not Mentioned			
8	Problem Solving	Not Mentioned			
9	Planning	Not Mentioned			

**Sub-Theme Three: Behavioral Dimensions:** The behavioral dimension nurtures the ability of learners to act in compassionate, respectful, and non-violent ways, building constructive relationships. It also refers to action competencies, such as participating constructively in community (local or global) projects that promote sustainable development in their immediate environment and beyond. Finally, the behavioral dimension helps learners apply learning according to local community norms or broader societal standards. **Table 7** represents a detail picture of the current sub-theme.

**Table 7.** Sub-theme 3: Behavioral Dimension.

S. No.	Sub-Themes	In curriculum	semester	course	Unit
1	Civic Responsibility	Not mentioned			
2	Transformation (Individual, Societal, Institutional)	Not mentioned			
3	Waste Management/Recycling	Not Mentioned			
4	Learning Environment	Not mentioned			
5	Whole-Institute Approach	Not Mentioned			
6	Technological Use for Environmental Solution	Not Mentioned			
7	Leadership for Environmental Causes	Not Mentioned			
8	Environmental Saving Projects	Not Mentioned			

The content comes under the sub-theme behavioral transformation, which covers Environmental solution, has not been covered totally.

### 9.2. Theme Two: Planning and Implementing Environmental Education

Subtheme One: Students’ Developmental Need/knowledge of leaners.

Subtheme Two: Teaching Strategies knowledge of Instructional Methodologies.

Subtheme Three: Planning for instruction.

Subtheme Four: 21 Century Competencies/lifelong learning skills/Skills for understanding and addressing environmental issues.

Subtheme Five: Knowledge of environmental education materials and resources.

Subtheme Six: Technologies that assist learning.

Subtheme Seven: Learning Environment/settings for instruction.

Subtheme Eight: Curriculum Planning for EE.

Subtheme Nine: Assess & Evaluate learning outcome.

**Table 8** below represents a detail picture of the current theme.

**Table 8.** Theme Two: Planning and Implementing Environmental Education.

S.No.	Sub-Themes	In curriculum	semester	course	Unit
1	Knowledge about Learners	Mentioned	1	Child Development	Early childhood, elementary and adolescent development, difference in development and special need, influence of society and culture in child development,
			5	Educational Psychology The Developmental Practicum	Recognize cognitive and effective needs during practice and use activities to meet those needs.
2	Knowledge & skills of teaching methodologies	Mentioned	1	General Methods of Teaching	Unit 2: classroom management, unit 3: teaching methods, unit 4: lesson plan, cooperative, lecture, discussion and demonstration methods in detail, teacher and students’ interaction. Unit 6: designing instruction including, objectives, lesson plan and assessment. Unit 7: self-regulated learning. Reflective journal, classroom observations, designing a lesson, teaching a lesson.
			1	Science 1	Unit 2, week 4: teaching of “Population & Ecosystem” Unit 3, week 7: teaching of “Diversity & Adaptation” Unit 4: The Blue Planet, Teaching of “Earth” to elementary grades.
			2	Classroom Management	Learning theories & CM, curriculum & CM, routine, schedule and time management, Planning the classroom environment.
			3	Developmental Practicum	Classroom observation

## Continued

			7	Pedagogy 1 & 2	Unit 2: Classroom Management Unit 3: teacher centered, student-centered Unit 4: Lecture, Demonstration, Discussion, Questions, and Cooperative Learning (3 weeks, 9 hours)
			1	Methods of Teaching	unit 5: teacher and students' interactions Unit 6: Designing Instruction: Goals and Objectives; Assessment; Plans; and Materials (4 weeks; 12 hours) Unit 7: self-regulated learning Assignments: design a lesson, teach a lesson, observation of class.
			3	The developmental practicum: 16 weeks, 144 hours with 120 hours in classroom.	Instructional planning and implementation practically
3	Skills for Instructional Planning	Mentioned	2	Classroom Management	
			3		
			4	Teaching social studies	Inquiry and critical approach
			4	The teaching practicum	Plan and implement lesson plan
			1	Science 1	Week 4: Teaching of "population & ecosystem" Week 7: teaching of "Diversity & Adaptation" Week 10: Teaching of "Earth" Inquiry-based and identify learning objectives.
			3	Science 2	Unit 4, week 10: Teaching "Earth system going constant change" Unit 5, Week 13: teaching "our Solar system and the universe"
			4	School, community, and teacher	
			4	General Methods of Teaching	Unit 7: Self-regulated learning
4	Skills for developing 21st century life-skills in children	Mentioned	4	General Methods of Teaching	Creating shared values & community
5	Knowledge and skills about Environmental Education	Not Mentioned			

**Continued**

6	Skills to use technology for teaching learning process	Mentioned	4	General methods of teaching	Planning the classroom environment
7	Skills for developing learning environment	Mentioned	4	Teaching practicum	Creating classroom environment
		Not Mentioned	5	Curriculum development	
8	Curriculum Designing Assess and Evaluate Learning	Mentioned	3	ICT in Education	Unit 2: ICTs Integrated into Curriculum and Instruction- (9 weeks/18 hours)
		Not Mentioned			
9		Mentioned			

The planning and implementing teaching is covered though, but specifically planning and teaching EE was not covered in the curriculum. Even if some topics were covered, they were not covered in depth. Like reflective practice, instructional skills, skills to use technology for teaching and learning, evaluating learning, and assessment and evaluation. Some topics were totally neglected, classroom management, Skills for teaching EE, skills for developing a learning environment, and curriculum design.

## 10. Discussion

This analysis highlights significant gaps in Pakistan's teacher education curriculum, particularly in addressing environmental education (EE) from a comprehensive perspective. While topics such as Earth's physical systems and ecosystems are covered, critical areas like human survival, well-being, and civic responsibility are either inadequately addressed or completely missing. These findings align with global trends observed in countries like Turkey, where [Hasan & Ismail \(2011\)](#) identified similar knowledge gaps and misconceptions about environmental topics, such as ozone depletion and acid rain.

However, successful EE reforms in other countries offer valuable insights for Pakistan. For instance, Finland integrates EE across subjects through experiential, place-based learning, encouraging outdoor education and hands-on environmental activities that foster critical thinking and problem-solving skills. Similarly, Sweden's "Eco-Schools" program prioritizes sustainable practices and engages students in real-world projects, such as waste management and energy conservation, empowering them to become active environmental stewards. These approaches demonstrate the importance of experiential learning, as [UNESCO \(2017\)](#) suggests, where students not only learn about ecology but actively interact with it to develop responsible decision-making skills.

In Pakistan, the absence of environmental solutions and practical pedagogical

strategies in teacher training programs exacerbates environmental challenges like water scarcity, deforestation, and poor waste management. To address these issues, the curriculum must include structured components such as measuring carbon footprints, project-based learning, and community-driven initiatives. Trainee teachers should be equipped with the skills to connect students emotionally and practically with nature, fostering environmental literacy and sustainable attitudes. Examples include outdoor activities that allow children to explore dynamic environments—climbing trees, navigating uneven terrains, and problem-solving in natural settings—to develop motor, cognitive, and social-emotional skills.

Behavioral pedagogies, such as community-based learning and localized environmental projects, have shown success globally but remain underutilized in Pakistan. Programs like Australia's *Bush Kinder* model and Japan's "Forest Schools" highlight the importance of building children's emotional connections to nature while incorporating environmental care into their daily lives. Such practices demonstrate the need for teacher training programs to integrate social-emotional dimensions, hands-on pedagogies, and critical thinking frameworks into EE curricula.

Furthermore, while formal instructional skills like planning and preparation are addressed in the Pakistani curriculum, they lack alignment with EE goals. International studies, including those by Meighan & Fuhrman (2018), emphasize the success of non-formal teaching methods, such as using extra resources, diverse teaching styles, and co-worker collaboration to connect learners with environmental issues. Teacher education programs in Pakistan can adopt similar practices by providing educators with professional development opportunities, project-based training, and supplementary EE materials to enhance their instructional effectiveness.

Finally, while aspects of 21st-century life skills—such as critical thinking, collaboration, and real-world problem-solving—are included in the curriculum, they lack depth and practical application. Countries like Singapore successfully integrate these skills into teacher education by combining EE content with technology, real-world case studies, and interdisciplinary approaches. Pakistani curricula must similarly focus on practical teaching strategies that prepare educators to instill these essential skills in students, enabling them to adapt and thrive in an ever-changing world.

In conclusion, aligning Pakistan's teacher education curriculum with global best practices will ensure educators are well-equipped to teach environmental topics effectively. Incorporating experiential learning, hands-on teaching strategies, and community-based projects will bridge existing knowledge gaps and foster a generation of environmentally responsible citizens who can actively contribute to sustainable development.

## 11. Conclusion

This qualitative content analysis of the curriculum highlights critical gaps,

particularly the exclusion of major topics in Environmental Education (EE), and emphasizes the need for practical improvements. To address these deficiencies, teacher education programs should integrate essential EE topics, such as climate change, sustainability, and biodiversity, into their curricula. Practical training modules, including fieldwork and case studies, must be incorporated to bridge the gap between theory and real-world challenges. Due to a particular type of analysis, different aspects like teachers' perspectives and classroom behaviors were not analysed. Regular professional development workshops should be conducted to enhance teachers' knowledge and equip them with effective strategies for delivering EE content. Additionally, adopting best practices from successful international programs and establishing mechanisms for ongoing assessment and feedback will ensure continuous improvement. These actionable steps will enable teachers to effectively teach critical environmental issues, fostering responsible behaviors and sustainable mindsets among students, thereby contributing to long-term environmental sustainability.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

### References

- (1987). *Report of the World Commission on Environment Development*. World Commission on Environment Development.
- (2014). *UNESCO Roadmap for Implementing the Global Action Programme on Education for Sustainable Education*. UNESCO.
- About-EE-and-Why-It-Matters (2021, August 6). Retrieved from North American Association for Environmental Education.  
<https://naaee.org/about-us/about-ee-and-why-it-matters>
- ACEE (2021). *Environmental, Energy and Climate Change Education in Alberta's Draft K-6 Curriculum/Analysis and Recommendation*.  
<https://pdxscholar.library.pdx.edu/cgi/viewcontent.cgi?article=1315&context=nwite>
- Barrable, A. (2019). Refocusing Environmental Education in the Early Years: A Brief Introduction to a Pedagogy for Connection. *Education Sciences*, 9, Article No. 61.  
<https://doi.org/10.3390/educsci9010061>
- Bernard, H. R. (2002). *Research Methods in Anthropology: Qualitative and Quantitative Approaches*. Alta Mira Press.
- Buckler, C., & Creech, H. (2014). *Shaping the Future We Want: UN Decade of Education for Sustainable Development; Final Report*. UNESCO.  
<https://unesdoc.unesco.org/ark:/48223/pf0000230171>
- Colorado State University (2016, Aug. 21). Retrieved from Colorado State University/Content Analysis. <http://writing.colostate.edu/guides/guide.cfm?guided=61>
- Cristóvão, A. M., Candeias, A. A., & Verdasca, J. L. (2020). Development of Socio-Emotional and Creative Skills in Primary Education: Teachers' Perceptions about the Gulbenkian XXI School Learning Communities Project. *Frontiers in Education*, 4, Article No. 160. <https://doi.org/10.3389/educ.2019.00160>
- Damoah, B., & Omodan, B. I. (2023). *Tracing the Footprints of Environmental Education*

*in Teacher Education: A Review of Pre-Service Teachers' Training in Universities.*

- Denieffe, S. (2020). Commentary: Purposive Sampling: Complex or Simple? Research Case Examples. *Journal of Research in Nursing, 25*, 662-663.  
<https://doi.org/10.1177/1744987120928156>
- EPA (2021). *What Is Environmental Education?* Retrieved August 22, 2021, from United States Environmental Protection Agency.  
<https://www.epa.gov/education/what-environmental-education>
- Ergin, D. Y. (2019). Environmental Awareness of Teacher Candidates. *World Journal of Education, 9*, 152-161. <https://doi.org/10.5430/wje.v9n1p152>
- Febriasari, L. K., & Supriatna, N. (2017). Enhance Environmental Literacy through Problem-Based Learning. *Journal of Physics: Conference Series, 895*, Article ID: 012163.  
<https://doi.org/10.1088/1742-6596/895/1/012163>
- Fonsén, E., & Ukkonen-Mikkola, T. (2019). Early Childhood Education Teachers' Professional Development towards Pedagogical Leadership. *Educational Research, 61*, 181-196. <https://doi.org/10.1080/00131881.2019.1600377>
- Franzen, R. L. (2018). Environmental Education in Teacher Education Programs: Incorporation and Use of Professional Guidelines. *The Journal of Sustainability Education, 16*, 1-19.  
[https://www.researchgate.net/publication/323225820\\_Environmental\\_education\\_in\\_teacher\\_education\\_programs\\_Incorporation\\_and\\_use\\_of\\_professional\\_guidelines](https://www.researchgate.net/publication/323225820_Environmental_education_in_teacher_education_programs_Incorporation_and_use_of_professional_guidelines)
- Fucsko, L., & Sax, B. (2019). Learning Activities for Environmental Education for Sustainable Development. In *Encyclopedia of Sustainability in Higher Education* (pp. 1082-1095). Springer International Publishing.  
[https://doi.org/10.1007/978-3-030-11352-0\\_216](https://doi.org/10.1007/978-3-030-11352-0_216)
- Guidelines for Excellence Professional Development of Environmental Educators (2020, August 21). Retrieved from NAAEE.
- Hassan, A., & Ismail, M. Z. (2011). The Infusion of Environmental Education (EE) in Chemistry Teaching and Students' Awareness and Attitudes Towards Environment in Malaysia. *Procedia—Social and Behavioral Sciences, 15*, 3404-3409.  
<https://doi.org/10.1016/j.sbspro.2011.04.309>
- Hume, T., & Barry, J. (2015). Environmental Education and Education for Sustainable Development. In *International Encyclopedia of the Social & Behavioral Sciences* (pp. 733-739). Elsevier. <https://doi.org/10.1016/b978-0-08-097086-8.91081-x>
- Lettau, J. (2021). The Impact of Children's Academic Competencies and School Grades on Their Life Satisfaction: What Really Matters? *Child Indicators Research, 14*, 2171-2195.  
<https://doi.org/10.1007/s12187-021-09830-3>
- Meighan, L. G., & Fuhrman, N. E. (2018). Defining Effective Teaching in Environmental Education: A Georgia 4-H Case Study. *Journal of Research in Technical Careers, 2*, 36.  
<https://doi.org/10.9741/2578-2118.1044>
- NAAEE (2021, February 5). *Environmental Education Materials*. Retrieved from Guidelines for Excellence.  
<https://eepr.naaee.org/resource/professional-development-environmental-educators-guidelines-excellence>
- Nousheen, A., Zia, M. A., & Waseem, M. (2024). Exploring Pre-Service Teachers' Self-Efficacy, Content Knowledge, and Pedagogical Knowledge Concerning Education for Sustainable Development. *Environmental Education Research, 30*, 321-333.  
<https://doi.org/10.1080/13504622.2022.2128055>

- Patton, M. Q. (2001). *Qualitative Research and Evaluation Methods*. Sage.
- Richter, B. W., & De Sousa, L. O. (2019). The Implementation of Environmental Education to Promote Sustainability: An Overview of the Processes and Challenges. *International Journal of Sustainable Development & World Ecology*, 26, 721-731. <https://doi.org/10.1080/13504509.2019.1672220>
- Rose, S., Spinks, N., & Canhoto, A. I. (2015). Qualitative Content Analysis. In S. Rose, N. Spinks, & A. I. Canhoto (Eds.), *Management Research: Applying the Principles* (p. 440). Routledge. <https://doi.org/10.4324/9781315819198>
- Saqib, Z. A., Zhang, Q., Ou, J., Saqib, K. A., Majeed, S., & Razzaq, A. (2020). Education for Sustainable Development in Pakistani Higher Education Institutions: An Exploratory Study of Students' and Teachers' Perceptions. *International Journal of Sustainability in Higher Education*, 21, 1249-1267. <https://doi.org/10.1108/ijsh-01-2020-0036>
- Spínola, H. (2021). Environmental Culture and Education: A New Conceptual Framework. *Creative Education*, 12, 983-998. <https://doi.org/10.4236/ce.2021.125072>
- Sukma, E., Ramadhan, S., & Indriyani, V. (2020). Integration of Environmental Education in Elementary Schools. *Journal of Physics: Conference Series*, 1481, Article ID: 012136. <https://doi.org/10.1088/1742-6596/1481/1/012136>
- Sultan, S., Ahmed, S., & Imran, M. (2020). Awareness Regarding Environmental Education: A Qualitative Study Suggesting Practical Steps in Education Leading to a Green Pakistan. *Global Social Sciences Review*, 5, 510-518. [https://doi.org/10.31703/gssr.2020\(v-i\).52](https://doi.org/10.31703/gssr.2020(v-i).52)
- Tilbury, D. (2011). *Education for Sustainable Development: An Expert Review of Processes and Learning*. UNESCO.
- Tran Ho, U., Lepage, B. A., & Fang, W. (2023). Environmental Education in Pre-School Teacher Training Programs in Vietnam: Situations and Challenges. *Journal of Early Childhood Teacher Education*, 44, 703-722. <https://doi.org/10.1080/10901027.2022.2136552>
- UN (1987). *Brundtland Report*. The World Commission on Environment and Development (WCED). <https://www.are.admin.ch/are/en/home/media/publications/sustainable-development/brundtland-report.html>
- UN (2015, September 25). *Transforming Our World: The 2030 Agenda for Sustainable Development*. Retrieved from Sustainable Development. [https://www.unescap.org/sites/default/files/UN\\_DPI\\_SDG\\_presentation\\_final.pdf](https://www.unescap.org/sites/default/files/UN_DPI_SDG_presentation_final.pdf)
- UN General Assembly (2017). Education for Sustainable Development in the Framework-A/RES/72/222. In *Resolutions of the 72nd Session* (pp. 1-5). UN. <https://undocs.org/en/A/RES/72/222>
- UNESCO (2007). *The UN Decade of Education for Sustainable Development (DESD 2005-2014) The First Two Years*. UNESCO.
- UNESCO (2017). *Education for Sustainable Development Goals: Learning Objectives*. UNESCO.
- UNESCO (2019). Framework for the Implementation of Education for Sustainable Development (ESD) beyond 2019. In *General Conference, 40th 2019* (p. 19). UNESCO.