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Understanding Education for Sustainable Development: Prospective Teachers' Perspectives, Pedagogical Approaches, and Implementation Challenges

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Abstract: *The present qualitative phenomenological study focuses on exploring the prospective teachers' perspectives and strategies regarding Educational for Sustainable Development (ESD) in a district of Punjab. In the present study, six prospective teachers teaching in private educational institutions were selected purposively. Self-developed semi-structured interviews were used to obtain data, which was analyzed employing thematic analysis, supported by NVivo 15, to detect patterns and themes from the data. The findings revealed five key thematic areas: understanding of sustainability, important aspects/topics in ESD, essential skills for students, implementation strategies, challenges, and solutions. Moreover, the educators demonstrated a comprehensive insight into sustainability, focusing on resource preservation, intergenerational obligation, and systems thinking. The study identified active learning methodologies, project-based approaches, and real-world integration as preferred pedagogical strategies. However, the participants faced different challenges, like conceptual complexity, resource constraints, and student engagement issues. The current study highlights the need for structured support systems, enhanced professional development, and institutional backing for effective ESD implementation.*

Key Words: Education for Sustainable Development, Teacher Perspectives, Pedagogical Approaches, Environmental Education Implementation

Introduction

Education for Sustainable Development (ESD) has come to be regarded as an important paradigm in current education systems in developing countries, particularly in which environmental, social, and economic challenges have to be addressed alongside education goals. ESD implementation by teachers is central to developing future generations' understanding and capacity to tackle these challenges, which are becoming ever more complex in a global community grappling with sustainability imperatives. Such a multidimensional paradigm implicates inextricably intertwined environmental, social, economic, institutional, cultural, and ethical dimensions of planetary sustainability challenges (Steele & Rickards, 2021).

Laurie et al. (2016) illustrate that education has become of vital importance in fostering sustainability consciousness and driving transformative changes so as to set the requirements for a sustainable future. Education, regarded as an effective tool for inculcating knowledge and developing attitudes and behaviour, has a significant responsibility to equip individuals with sufficient competencies to operate sustainability development complexities (Abulibdeh et al., 2024). The realization of these principles spurred the integration of sustainability principles within educational curricula on all levels and disciplines (UNESCO, 2017).

UNESCO (2017) has promoted ESD, in other words, a transformative learning process that equips learners with the abilities necessary to make informed decisions and responsible actions for the benefit of

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the environment, an economically viable society, and a just society, both now and in the future, whilst respecting cultural differences. ESD is created to be transdisciplinary and transformative, integrating into curricula, assessments, teaching methodology, and learning environments that foster critical thinking, problem-solving skills, and acting capacity to address sustainability challenges (Lavrinoviča, 2021). Critical thinking has been focused on in several earlier studies in the national context regarding teachers' perceptions (Jamil et al., 2021), teachers' practices (Jamil & Muhammad, 2019), policy documents integration (Jamil et al., 2024), textbooks (Jamil et al., 2024; Naseer et al., 2022).

Although ESD is recognized as important, there is a considerable disconnect between policy aspirations and classroom practice, especially in the Pakistani context. Teachers, as the main agents of educational change, have to face numerous challenges in translating sustainability concepts into effective pedagogical practices (Shakir et al., 2024). To develop more effective strategies for implementing ESD, it is necessary to understand their perspectives, approaches, and challenges.

While previous research has examined ESD implementation in other contexts, limited attention has been paid to understanding teachers' lived experiences and pedagogical approaches in the Pakistani context, where sustainability education can play a vital role.

This study addresses several essential aspects of ESD implementation. First, understanding how teachers conceptualize sustainability and its educational implications provides valuable insights into the current state of ESD implementation. Secondly, examining teachers' approaches to integrating sustainability concepts into their teaching practices helps identify effective strategies and potential areas for improvement. The study is also beneficial because it offers insights into ESD implementation in a rapidly developing urban context, which can inform similar initiatives in comparable settings. It is also important because identifying challenges and support needs helps inform teacher training and professional development programs.

Research Objectives

1. To explore prospective teachers' conceptualization and understanding of Education for Sustainable Development (ESD).
2. To investigate the pedagogical approaches and the implementation strategies they adopted for ESD in their teaching practices.
3. To identify the challenges faced by teachers in ESD implementation and propose solutions to attain effective sustainability education.

Literature Review

Traditionally, the emphasis on Education for Sustainable Development (ESD) has, in recent years, shifted to transformative learning approaches and systemic educational change. According to Gough (2022), the sustainable development of education calls for immediate action and huge paradigm shifts in education. However, this transformation has become ever more critical in the developing world, where environmental concerns merge with educational goals.

Different studies have been conducted in an international context. Ferguson et al. (2021) explored teachers' perspectives regarding sustainable development with educational implications. Less extent was found by the teachers regarding citizenship participation in sustainable development. A similar study was conducted by Waltner et al. (2020). This study examined ESD implementation from the teachers' perspective about ESD. It was a longitudinal study conducted from 2007 to 2019. The teachers' perspective was higher in 2019 as compared to 2007. Moreover, the teachers perceived that abstract policies were not needed; instead, concrete support was necessary for teaching and achieving the school's objectives. Another study was conducted by Nguyen (2018) regarding ESD in the Vietnamese context, exploring the perspectives of geography teachers. The findings of the study revealed that teachers' perceptions regarding ESD were different from the dimensions of ESD as proposed by UNESCO.

Moreover, the focus was on the practical experiences of teachers, training programs, curriculum, and social perceptions. Several other studies were conducted regarding ESD regarding teachers' perspectives

in the Basque autonomous community (Agirreazkuenaga, 2019) and pre-service teachers' perspectives on teaching regarding sustainable development (Andersson, 2017). Similarly, there are other studies in this regard as teachers' role in education for sustainable development (Timm & Barth, 2021), a review of emerging research regarding teacher education for sustainable development (Fischer et al., 2022), teachers' perspective regarding sustainable development in STEM education for secondary schools (Nguyen et al., 2020); emerging teaching and research development regarding competencies for sustainable development (Cebrián et al., 2020); a comparison of Qatar, Singapore and Newzealand regarding embedding education for sustainable development and SDGs values in the curriculum (Zguir et al., 2021).

There are several studies in the Pakistani context. From research on teachers' understanding and implementation of ESD, complex challenges and opportunities emerged. In their study, Kalsoom et al. (2017) carried out an overview of Pakistani pre-service teachers' (students) sustainable consciousness compared with Swedish upper secondary school students. The findings of the study revealed lower sustainable consciousness than Swedish upper secondary school students. In the same way, Shakir et al. (2024) investigated the key role of educators in incorporating Sustainable Development Goals in teaching and curriculum. The key role of teachers was found for the growth of sustainable development with a focus on teachers' access to essential skills, knowledge, and resources for a bright, sustainable future. Sustainability has been explored through textbook analysis in different studies regarding the incorporation of sustainability in education like ESD from the analysis of English textbook grade V (Jamil et al., 2024), English textbook grade 8 (Jamil et al., 2024), and in Pakistan Studies textbook for grade X (Jamil et al., 2024). Different other studies have been conducted in different contexts of sustainability in education like students' and teachers' perspectives regarding ESD in higher education institutions (Saqib et al., 2020), teacher educators' preparedness for re-orienting teacher education programs for sustainable development (Mirza, 2020); secondary school teachers' perception and awareness of integration about ESD (Malik et al., 2022); implication regarding sustainable development goals for quality education in higher education institutions (Salman et al., 2023); role of quality education in sustainable development (Awan & Hussain, 2020); and sustainability in higher education (Habib et al., 2021).

Gough (2022) also focuses on what a sustainable future might look like in education, how change will need to happen in how we teach, and that it will take more than just policy reforms. With the increasing sophistication of environmental sustainability challenges, there is an increasing need for effective ESD implementation, especially in dynamic regions, such as among the new member states and the countries in Southeast Asia, where the challenges for national environmental protection as well as social issues are intertwined with educational goals.

Research Methodology

The focus of this qualitative study was to understand prospective teachers' perspectives and practices regarding Education for Sustainable Development (ESD) in the city of Punjab, Pakistan. The research design for the current study was phenomenology as, according to Creswell and Poth (2016), this design is used to understand the lived experience of the participants in their contexts. Six prospective teachers were chosen from different private educational institutions with different teaching experiences (from 6 months to 5 years). The sampling strategy used in this study included diverse perspectives and conformed to the manageable. According to Patton (2020), purposive sampling is appropriate for qualitative research that seeks to understand an exceptionally in-depth one or a small number of phenomena, and this was the method of sampling that was used. The data collection was carried out through semi-structured interviews developed based on research objectives, and the interview protocol for the study was developed. The interviews lasted for 30-40 minutes and were carried out at the location chosen by the participant to ensure a place where the participants would feel comfortable and be open in their responses. With participant consent, all interviews were audio recorded and verbatim transcribed. Interviews in Urdu were translated into English. The thematic analysis approach, as provided by Braun and Clarke (2022), was used to provide an in-depth exploration of how teachers conceptualized, practiced, and dealt with the challenges of ESD in their respective contexts with the facilitation of NVivo 15 software.

Findings of the Study

A detailed analysis of the responses provided by six teachers from various schools is provided regarding their interpretation and implementation of ESD. Five themes were understanding of sustainability, important aspects/topics in ESD, essential skills for students, implementation strategies, challenges, and solutions. Further details are as follows:

Understanding of Sustainability

The participants generally saw the sustainability of the study in multiple dimensions. Key sub-themes, namely resource-centric understanding, intergenerational responsibility, and system thinking approach, were explored. Further details are as under:

In most instances, educators adopt a resource management framing of sustainability that necessitates responsible resource use. This view echoes the overall trends in the sustainable discourse in education. According to a participant, it was described as follows:

"Sustainability is our society's ability to exist and develop without depleting all of the natural resources needed to live in the future" (Participant A)

This resource-centric perspective is further elaborated by Participant B, who emphasizes the replacement aspect in the following words:

"The survival and development of our society without exhausting all natural resources necessary for existence into the future is our society's sustainability" (Participant A)

A significant finding is the strong emphasis on intergenerational responsibility. The teachers consistently frame sustainability in terms of future generations' needs:

"Sustainability means taking care of the Earth now so it can take care of us and our future generations later" (Participant C)

One particularly illustrative metaphor emerged from Participant D's response:

"It is like borrowing something from a friend - you want to return it in good condition, not broken or worn out."

The findings indicate an emerging understanding of sustainability as a complex system requiring integrated approaches:

"Sustainable development supports this long-term goal with the implementation of systems, frameworks, and support from global" (Participant E)

Important Aspects/ Topics in ESD

The responses highlight several key areas like active and participative learning, environmental challenges, systems thinking, and global citizenship. Further details are as follows:

The research reveals a strong preference for experiential and participatory learning approaches:

"There is no correct pedagogy for sustainability education, but there is a broad consensus that it requires a shift towards active, participative, and experiential learning methods" (Participant A)

The educators identified key areas that form a comprehensive ESD curriculum, like systems thinking, global citizenship, environmental literacy, social justice and equity, cultural diversity, and Indigenous perspectives. It was articulated by participant D in the following way:

"For effective Education for Sustainable Development (ESD), ten key topics should be covered... These topics will help students become informed, engaged, and active leaders in creating a sustainable future."

Essential Skills for Students

The findings highlight three primary skill categories essential for sustainability education: cognitive skills (critical thinking, problem-solving, systems thinking), social skills (collaboration, communication,

cultural competence), and personal skills (self-awareness, emotional intelligence, adaptability). Participant E described as

"Future-Oriented Thinking, Decision-making, Critical thinking"

It was also summarized by Participant F in the following words:

"Students should develop ten key skills... including Critical thinking, Problem-solving, Collaboration and communication, Systems thinking, Emotional intelligence and empathy..."

Implementation Strategies

The findings indicate a strong preference for project-based learning approaches:

"Project-based learning (PBL) is a fantastic tool for weaving sustainability into a variety of subjects. It may include designing a sustainable school..." (Participant A)

Educators emphasize the importance of connecting sustainability concepts to real-world applications:

"Integrating sustainability into my subject can be achieved by incorporating real-world examples and case studies that highlight the educational, social, and economic impacts" (Participant C)

Challenges and Solutions

The research identified several key challenges like conceptual complexity, resource constraints, and student engagement. The solutions proposed by the participants were simplification strategies, interactive approaches, pedagogical adaption, resource development, and professional development of the teachers. Regarding issues described by the participants, one of the participants described the following:

"Teaching complex sustainability issues to young students can be challenging due to the abstract nature of the concepts, their interdisciplinary scope" (Participant E)

There were also explored resource constraints like lack of funding, time management issues, and limited curriculum flexibility. In the same way, student engagement was another challenge that was narrated by a participant as

"The biggest issue of students to get things quickly like scrolling the short and screaming to enquire knowledge" (Participant B)

The participants of the study offered various strategies to address these challenges:

"Simplify concepts by breaking them down into smaller, more relatable ideas and use appropriate analogies or stories" (Participant E)

As per the findings of the study, the proposed solutions presented by Participant E narrated in the following way:

"Use strategies such as Relatable examples and case studies, Interactive and engaging activities, Visual aids and storytelling, Focusing on solutions and agency" (Participant E)

Discussion

The findings of this phenomenological study provide significant insights into how prospective teachers conceptualize and implement Education for Sustainable Development (ESD) in the educational context. When examining these findings in relation to existing literature and theoretical frameworks, several important patterns and implications emerge. The results of the overall ESD conceptualization by teachers were consistent with the earlier studies, especially those of Nousheen et al. (2020), who researched sustainability understanding among Pakistani teachers. Participants' interpretations of these principles varied widely from purely environmental views to encompassing multiple views tied to social and economic aspects of sustainability, and participants had fundamental knowledge of sustainability principles. Consistent with Kalsoom et al. (2017) observations, participants showed a strong preference for active learning methodologies and project-based approaches. These adaptations demonstrate the necessary

localization of global sustainability concepts. Professional development needs emerged as a crucial theme in our findings, particularly when considered alongside existing research.

The participants expressed a need for specialized training about the importance of contextual teacher preparation. The study reveals additional dimensions specific to industrial urban settings, including the need for industry-specific environmental knowledge, understanding of urban sustainability challenges, skills in connecting global concepts to local issues, and capacity for interdisciplinary integration. Basic resource limitations remain a concern, but our participants found creative ways to take advantage of industrial community resources for educational purposes, which serve as possible models for other urban industrial settings. That finding is especially important because it provides practical solutions for resource-constrained environments. A major finding was the role of cultural context in ESD implementation. Analysis of the responses of the participants showed sophisticated strategies for striking a balance between the global sustainability principles and the local cultural values for cultural sensitivity in the implementation of ESD. This balance seems essential in industrial urban contexts, which combine traditional values with modern environmental demands. The implications of these findings for practice are large, particularly for teacher preparation programs, curriculum development, resource allocation, and community engagement. This suggests that novice ESD teachers need professional development-tailored programs (Foster & Foster, 2023) for teaching ESD within industrial urban contexts and that locally relevant ESD curriculum materials need to be developed (Ferguson et al., 2022) that link global sustainability concepts to local industrial and urban realities.

Conclusion

The present qualitative research adopts a phenomenological process to explore the perspective of six prospective teachers on ESD in a district of Punjab. Describing the best practices, the study unveils various strategies employed by teachers for the enhancement of sustainability in the context of an industrial urban learning environment. Even though the study reveals major problems, which may include limited resources, few professional development activities, and issues with integration of the curriculum, through industry-academic linkages and public collaboration, there could be chances for risky solutions. The research makes three key contributions: giving a real-life account of the implementation of ESD, making recommendations to educators in industrial urban environments, and emphasizing the significance of context-specific implementation of ESD. The findings indicate that more contextually oriented ESD training courses are recommended as well, and attention should be paid to enhancing collaborations between schools and employers. The extension of such knowledge in future research areas includes longitudinal and student outcome examinations as well as analyses of industry-education partnership effectiveness. The research findings stress that the achievement of implementing the ESD program is dependent on the combination of global sustainability priorities with the local contexts of teaching, adequate resources, prepared teachers, and effective collaborations with the community.

Recommendations

Based on the study's findings, the following are the key recommendations:

- Educational institutions are encouraged to establish specific training programs for ESD instructors targeting the challenges in which local environmental problems and industry-related sustainability issues can be included in the curriculum to equip teachers with more practical implementation abilities.
- Policymakers should establish formal frameworks for industry-education partnerships to facilitate the sharing of resources, experiential learning, and on-ground practical sustainability projects between schools and local industries.
- The teacher education programs should incorporate context-specific sustainability modules composed of global ESD principles together with local environmental challenges to ensure that the prospective teachers are equipped with skills to make their students' sustainability education a relevant and meaningful issue.

- All the schools should form collaborative networks among their teachers engaged in ESD, becoming platforms for sharing its best practices, resources, and innovative teaching techniques in the industrial urban context with regular professional development opportunities.
- Educational administrators should foster socially embedded comprehensive assessment frameworks that assess both theoretical understanding and meaningful achievement of sustainability concepts, containing project-based assessments and community engagement components in order to measure the actual impact of abilities.
- Policymakers should establish formal frameworks for industry-education partnerships in industrial cities, facilitating resource sharing, experiential learning opportunities, and practical sustainability projects between schools and local industries.

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