

Research Article

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Rethinking Education: Empowering Preservice Teachers for Sustainability in Education in South Africa

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Abstract

Background/purpose. Education for sustainability (EfS) has been identified as a critical approach to equipping preservice teachers to address complex sustainability problems. Many teacher education institutions have been identified to equip preservice teachers with tools to promote sustainability in diverse learning environments. However, there is little EfS pedagogical knowledge to prepare preservice teachers thoroughly and systematically. Hence, they graduate without the necessary knowledge and skills to teach in ways that enable them to embed EfS. This study explored how EfS can be meaningfully embedded within initial teacher education in a South African context. It investigated the competencies preservice teachers should develop and the pedagogical and institutional strategies required to support transformative learning.

Materials/methods. Using a qualitative case study design, the research employed semi-structured interviews and document analysis to explore the perspectives of lecturers and preservice teachers at the University of the Free State, after obtaining permission from both the Ethics Committee and the participants. The interviews lasted for 30 minutes each. Data analysis through thematic analysis yielded six themes.

Results. The findings reveal that practical implementation in teacher education faces systemic barriers, including limited institutional support and incoherent curriculum design. The study also found a need for intentional, holistic approaches to integrating EfS that are rooted in critical reflection and transformative pedagogy.

Conclusion. The study concludes that EfS is not systematically implemented but rather according to understandings of what it is about. The lack of opportunities for consistent capacity-building due to a lack of guidelines leads to limited exposure to existing pedagogical preparedness. The study offers practical recommendations for embedding sustainability across teacher education programs and highlights the importance of aligning national and international policy frameworks with local practices.



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1. Introduction

There is a growing demand for educational systems to produce individuals who can contribute to more resilient, equitable, and ecologically conscious communities, as the need to tackle global sustainability issues necessitates it (Parry & Metzger, 2023; Mulà & Tilbury, 2023). Teacher education, in particular, has been recognized as a critical site for transformative change by equipping preservice teachers with the skills they need to promote sustainability across a variety of learning settings (Stevenson et al., 2012). Teachers must fundamentally change their perspectives and behaviors to embark on the path of sustainable development (Bertocchi et al., 2020). These changes can be accomplished only through education that fosters critical thinking on the key ideologies and structures that support sustainable lifestyles and that motivate and facilitate change-making (UNESCO, 2017). Research has shown that integrating sustainability into all educational stages, including teacher education, is required by international frameworks, such as Sustainable Development Goal (SDG) 4.7 and the UNESCO Education for Sustainable Development (ESD) Roadmap (Stevenson et al., 2012).

According to Holst (2023), equipping everyone with the skills, values, and information necessary to construct a sustainable future jointly is the only way to achieve sustainability. He added that a comprehensive overhaul of educational policy, curricula, and research is necessary to educate for sustainable development. This entails reconsidering the objectives, subject matter to be taught, and instructional strategies. To bring about systematic changes at all educational levels, it also requires transformative behaviors such as adaptability, innovation, and risk-taking. Focusing on educational consequences has necessitated a shift from an information-deficit model of education to a competence-based model to promote EfS. Olsson et al. (2022) contended that preservice teachers should possess these competencies to implement EfS.

On the one hand, preservice teachers may not have been empowered or exposed to the concept of EfS, leaving them feeling ill-equipped to incorporate sustainability into their teaching. Consequently, preservice teachers may not have developed critical competencies for sustainability, which undermines the transformative goals of EfS and leads them to fail to engage meaningfully with real-world sustainability issues (UNESCO, 2017). This misalignment or poorly articulated policies in teacher education leads to confusion and inaction in embedding EfS into curricula (Buchanan, 2021). Research continues to show that preservice teachers are often underprepared to engage with sustainability in their classrooms (Fischer et al., 2022; UNESCO, 2022). Uneven implementation, lack of policy coherence, and limited institutional support hinder progress toward meaningful integration. This paper explores how initial teacher education can be leveraged to develop sustainability competencies in preservice teachers. Little has been conducted globally on embedding EfS across higher education curricula. Hence, this study investigates how EfS is embedded in curriculum design, how it is supported by pedagogical and institutional strategies, and what challenges arise in implementing such approaches in a teacher education context. The study contributes to the body of knowledge that seeks to reimagine teacher preparation as a foundation for sustainable futures.

2. Research Questions

1. How does inadequate preservice teacher training impact their pedagogical integration of EfS?
2. What are the main challenges and enablers in embedding EfS in teacher training institutions?
3. What key sustainability competencies should preservice teachers develop during their training?

3. Literature Review

Education for sustainability has been increasing in educational discourse and practice since 1990 (Alsina & Mul, 2019; Rieckmann, 2022). According to Rieckmann (2022), EfS aims to enable students to participate in societal activities and transformative processes necessary for sustainable development. It helps them develop adaptive and resilient skills to handle change and complex situations. Hence, preservice teachers must be empowered with knowledge and competencies to engage their students as informed citizens driving the necessary transformation (UNESCO, 2017).

3.1. Conceptualizing Empowerment in Teacher Education

Empowerment is the process of giving individuals or groups control over their lives and enabling them to make independent decisions (Ohlsson et al., 2024; Berñe et al., 2023). According to Doneys et al. (2020), it is more than just granting authority; it is about creating an atmosphere that fosters individuals' potential and equips them with the confidence and tools they need to engage completely and authentically. This means it focuses on removing systemic barriers to individual engagement, increasing access to opportunities, and cultivating a culture that values all voices. It also entails developing skills, awareness, and possibilities for change, which are aided by leadership, self-care, and supportive communities (Cavaliere & Almeida, 2018). In the context of teacher education, empowerment is defined as allowing preservice teachers to develop agency, which includes the confidence and capacity to make pedagogical and professional decisions. It enables them to critically reflect on their positions as teachers within larger social, environmental, and political contexts. It will assist students in developing and implementing sustainable practices in the schools and communities where they will work and live in the future.

It also includes actively participating in the development of educational policies, curricula, and classroom practices that promote equity and sustainability. Empowerment is defined as the process by which preservice teachers acquire the information, skills, values, and dispositions required to engage autonomously and collaboratively in educational transformation and sustainability.

3.2. Empowerment Dimensions Relevant for Sustainability

As preservice teachers are considered critical agents of change, they are not just transmitters of content but rather powerful agents of social and ecological change. They are pivotal for translating policy into classroom practice and need to be empowered (Parry & Metzger, 2023). This implies that they need to be empowered to understand the dimensions of empowerment for sustainable education. Key dimensions of sustainability in teacher education include knowledge and understanding of core sustainability concepts (such as environment, society, and economy). These include knowledge, which demands that preservice teachers master a broad and integrative knowledge base that encompasses three aspects of sustainability, such as environmental, social, and economic (Dushkova & Ivlieva, 2024; Yunus et al., 2021). This comprehensive understanding can enable them to grasp the challenges of sustainability and engage their future students in complex problem-solving (Maisa et al., 2022). Therefore, deepening understanding of these key concepts equips teachers with a knowledge base to integrate sustainability into teaching and work with the broader community.

Furthermore, empowerment includes pedagogical skills that help teachers to design and deliver sustainability-focused learning experiences, encouraging innovation and contextualized teaching for sustainability (Mulà & Tilbury, 2023). This encompasses the ability to integrate sustainability into the curriculum, meaning moving beyond simply teaching about climate change and embedding sustainability principles into all subjects through a whole-institution approach (Mulà & Tilbury, 2023; Park et al., 2022). This means adopting classroom practices that engage students in hands-on activities and service-learning initiatives. The institutional culture is developing a whole-institutional

approach where preservice teachers are prepared to empower students to become agents of change for a sustainable future.

Another dimension of EfS is learning, which relates to intrinsic learner attributes, including motivation, learning habits, and sustained commitment to pursuing sustainability education (Davis et al., 2024). Decision-making as a dimension of teacher empowerment involves preservice teachers' participation in critical decisions that directly affect their teaching and learning. The decision-making empowers them to have a genuine voice in decisions that affect their classrooms, including curriculum choices and student behavior management strategies (Ahrani et al., 2021). This means they can control their working environment and teaching space, and feel appreciated by other staff. With increased control, individual teachers are empowered to make decisions and take actions that affect their lives, whether in their health, work, or community. The involvement of teachers in decision-making ensures their voices are heard and respected by their leaders (principals) (Tukura & Sapo, 2023). This means they plan together meetings that relate to teaching and learning. Therefore, as involvement in decision-making increases, job satisfaction and productivity also increase. This motivation serves as a driving force that ensures that preservice teachers remain engaged in sustainability values beyond the confines of formal coursework.

These active habits of mind and lifelong-learning characteristics are basic for sustaining this engagement, because EfS necessitates ongoing development in response to evolving global challenges (Dushkova & Ivlieva, 2024). This implies that preservice teachers must possess sustainability competencies to help their students participate in collective decisions that improve their societies. These competencies support them in analyzing sustainability issues, designing instructional approaches, collaborating with diverse stakeholders, and effectively conveying complex sustainability concepts (Maisa et al., 2022). In particular, critical thinking enables perceptive analysis and fosters students' ability to make informed decisions aligned with sustainable goals. Without this preparation, the capacity of education systems to contribute meaningfully toward sustainable development goals remains limited. This also highlights preservice teachers' unique position to shape the mindset and behavior of future generations, positioning them as future contributors to sustainable societal and economic systems (Kimwarey et al., 2014). The transmission of sustainability principles through education is critical and involves not only disseminating knowledge but also cultivating attitudes and motivations that are aligned with sustainable futures (Kiral, 2025; Maisa et al., 2022). Embedded in this perspective is the recognition that teacher education programs must change pedagogical approaches, integrate transdisciplinary sustainability content, and foster competencies that empower preservice teachers to become proactive societal actors.

Professional development: Empowerment involves providing teachers with opportunities to deepen their knowledge and skills, often aligned with the school's vision. This helps school administrators identify teachers' needs to provide learning to their students. Additionally, it helps teachers progress professionally by fostering a sense of distress and of being valued when their needs are identified and satisfied (Turuka & Sapo, 2023). Professional empowerment also fosters autonomy, leadership, and reflective practice, positioning teachers as change agents and lifelong learners. Autonomy refers to giving teachers the freedom to make choices about how they teach and manage their classrooms, enabling them to be innovative and overcome limitations.

3.3. Integrating Sustainability into Disciplinary Content

The integration of sustainability into disciplinary content is a vital strategy for empowering preservice teachers. Transdisciplinary approaches blur traditional disciplinary boundaries, allowing sustainability themes to be addressed holistically across subjects such as science, technology, engineering, mathematics, and social sciences. Parry and Metzger (2023) described this as a holistic, multidisciplinary approach that integrates the social, environmental, and economic pillars of

sustainability, enabling learners to contribute to more sustainable societies. Employing real-world contexts enriches relevance and engagement in teacher education. Adapting place-based learning initiatives empowers learners to connect classroom knowledge with local environmental and social issues, facilitating authentic inquiry and civic participation (Kimwarey et al., 2014; Yunus et al., 2021). Similarly, courses that contrast and combine social, technological, and ecological perspectives enable preservice teachers to appreciate the multidimensional nature of sustainability and consider implications beyond environmental science alone (Vikane & Høydalsvik, 2024). Innovative pedagogies, such as project-based learning (PBL), have proven effective in developing sustainability competencies in preservice teachers.

Engagements such as online summer courses that involve collaborative projects with national and international partners broaden perspectives and encourage authentic sustainability problem-solving. Such experiential learning cultivates environmental awareness, project management skills, and communication abilities aligned with sustainability frameworks (Wals & Benavot, 2017). By embedding sustainability concepts into core curricular areas, preservice teachers develop a more comprehensive understanding that mirrors the complexity of real-world challenges (Christodoulou & Papanikolaou, 2023). Other strategies supporting sustainability integration include project-based tasks, collaborative problem-solving, and community engagements that mirror the interconnectedness of sustainability goals in practice. These approaches do not merely address knowledge transmission but also foster critical thinking, agency, and ethical decision-making skills, which are crucial for transformative education (Vikane & Høydalsvik, 2024).

Despite the need for sustainability-oriented education, traditional teacher preparation models often fall short in effectively integrating sustainability into education (Stevenson et al., 2012). Only conventional teaching practices, characterized by conservatism and rigidity, tend to disempower students and limit their engagement with the complex and interdisciplinary nature of sustainability. These longstanding practices often create passive learning environments that hinder the development of critical competencies necessary for sustainable teaching and learning (Field et al., 2024). There is also an existing gap between the adopted constructivist theories that underpin much of modern teacher education and their actual implementation in practice, where preservice teachers struggle to translate theoretical frameworks into easy, sustainability-informed pedagogies (Kimwarey et al., 2014). This inhibits them from embedding EfS at all levels of education. Curricular barriers, such as overly rigid curricula that leave little room for sustainable development, should be revised to incorporate sustainability education. Furthermore, institutional barriers, including limited resources and support systems, complicate efforts to embed sustainability meaningfully within teacher education (Kiral, 2025). Curriculum frameworks often lack integration or adopt fragmented approaches to sustainability, making it difficult for preservice teachers to develop coherent, comprehensive sustainability literacy. Additionally, lecturers face challenges in navigating rooted norms and resistance to change within educational institutions, limiting the scope and depth of sustainability content and pedagogical innovation (Yunus et al., 2021). Such challenges expose the limitations of traditional models and highlight the urgency for systemic transformation in teacher education designed to empower preservice teachers sustainably.

4. Theoretical Framework

The study draws on transformative learning theory (TLT), developed by Mezirow (1997), and the sustainability competencies framework by Wiek et al. (2011). Mezirow's TLT advocates that adults learn by critically reflecting on their experiences, which leads to changes in their beliefs, values, perspectives, and behaviors. It focuses on five key concepts in transformative learning and underscores that authority figures and society shape learning. Mezirow believed that learners absorb knowledge and values from formal sources that they are expected not to question critically but rather accept. He argued that in adulthood, learning becomes transformative because adults have the

capacity to reflect critically on their prior assumptions and beliefs. He believed that adults could recognize distortions in their worldview, challenge those perceptions, and eventually change their thinking. The transformative process is often sparked by life experiences that cause cognitive dissonance or discomfort, prompting deeper introspection. This focuses on individual cognitive change rather than social transformation. It is relevant to the current study as it aligns with the modern goals of EfS, which seek to prepare learners not just for technical skills but also to become adaptive, self-aware, and critical thinkers (Mezirow, 1997). This can also inform educational transformation when lecturers use transformative teaching methods that encourage preservice teachers to question their assumptions and think critically, thereby reconsidering their deeply rooted beliefs about teaching. It therefore emphasizes autonomy, allowing adults to question their beliefs because they are self-directed and reflective. This can also lead to more profound changes in their behavior and understanding, thereby fostering lifelong learning in a rapidly changing world.

Additionally, the study made use of the sustainability competencies framework developed by Wiek et al. (2011) and Rieckmann (2022). It emphasizes competencies distinct from other fundamental competencies taught in a programme and identified under this framework. Secondly, futures thinking is the capacity to comprehend and appraise various futures, including probable, desirable, and potential ones in order to develop one's own future visions. It can also apply protective rules to evaluate the effects of activities, address risks and changes, and manage societal shifts and hazards (Wiek et al., 2011). The ability to collaboratively create and implement initiatives that promote sustainability, both locally and globally, is referred to as strategic competence.

According to Wiek et al. (2011), collaboration competence is the capacity to learn from others, to comprehend and respect the needs, viewpoints, and behaviors of others (empathy), and to comprehend, relate to, and be sensitive to others (empathic leadership). This includes handling group conflicts and promoting cooperative and participatory problem-solving. The last competence is normative competence, which is the capacity to comprehend and consider the standards and values that guide one's behavior as well as to negotiate sustainable values. These competencies provide a benchmark for structuring preservice teacher curricula and assessing the outcomes of EfS programs. Although this theory offers an integrated perspective on how initial teacher training programmes can develop sustainability-literate individuals, it places greater emphasis on individualism than on social communities.

5. Methodology

The qualitative research design used in this study is based on the interpretivist paradigm (Creswell & Creswell, 2023). The aim was to explore how EfS is conceptualized, implemented, and experienced in initial teacher training programs. The study adopted qualitative methods to uncover the complex, context-specific meanings that lecturers and preservice teachers assign to sustainability education (Sauders et al., 2023). A purposive sampling strategy was used to identify five lecturers responsible for curriculum development and teaching, as well as ten preservice teachers who are final-year students in the Faculty of Education (Largan & Morris, 2019). This was done across the faculty departments, ensuring that all departments were included in the sample. Data were collected through semi-structured interviews with individual participants to explore their understanding, experiences, and perceptions of EfS in their training, which lasted 30 minutes and were audio-recorded to capture everything said. Documents such as course outlines and syllabuses were also used for triangulation purposes to understand how EfS is integrated into teaching and learning (Sauders et al., 2023). All recorded audio files were transcribed to familiarise herself with the dataset and were coded (Creswell & Creswell, 2023). The searcher identified recurring themes and named them. The researcher obtained permission from the relevant board, and all participants were informed of the study's purpose and procedures. Informed consent, confidentiality, and voluntary participation were ensured (Creswell & Creswell, 2023). Thematic analysis revealed five major

themes that illustrate how EfS is integrated into initial teacher education as well as the experiences of both lecturers and preservice teachers. These themes emerged from the data, which were analyzed thematically using the Braun and Clarke (2024) framework. Then, followed the writing up of the manuscript.

6. Discussion

This study examined how EfS is integrated into initial teacher education, focusing on the competencies developed, the pedagogical practices employed, and the institutional strategies adopted. The findings reveal both potential and significant gaps in current practices, which resonate with global literature on teacher education and sustainability.

6.1. Fragmented Integration and Lack of Systematic Curriculum Design

Participants highlighted that sustainability themes were present in several modules, but their inclusion was neither systematic nor explicitly guided by a unified framework. This led to varied understandings of what constitutes EfS across departments. The findings also imply that EfS is inconsistently embedded across courses, confirming similar concerns raised in international studies. This concurs with Wals and Benavot (2017) that sustainability education is often marginalized or inconsistently represented in teacher education programs. The fragmented approach observed at the University of the Free State underscores the absence of a systemic framework to guide curriculum design and delivery at the institutional level. This undermines the development of holistic sustainability competencies as proposed by UNESCO (2017) and Wiek et al. (2011), which call for cross-disciplinary learning and systemic thinking. This aligns with UNECSO (2022), which states that when the curriculum is aligned with global goals, particularly SDG 4.7, strategic integration across subjects is required to ensure that preservice teachers acquire foundational knowledge and practical tools to address sustainability issues in diverse contexts. Without this coherence, the transformative potential of EfS remains underutilized in South Africa.

6.2. Gaps in Pedagogical Preparedness for Education for Sustainability

The findings revealed that limited exposure to EfS pedagogy represents a missed opportunity for capacity-building among preservice teachers. Participants reported that many preservice teachers and lecturers are not adequately prepared to teach EfS. Both lecturers and preservice teachers recognized that critically reflecting on societal issues helped them shift their mindsets. Some lecturers employed transformative pedagogies, such as scenario-based discussions and community projects, enabling preservice teachers to engage with real-world sustainability issues. As articulated by Evans et al. (2012), preservice teachers may feel ill-equipped to integrate sustainability concepts into their teaching without targeted training or prior exposure. Although some lecturers employed critical and experiential learning, these practices were not widespread. This aligns with Mezirow's TLT (1997), which emphasizes the role of critical reflection in challenging assumptions and fostering personal and social transformation. When lecturers reflect on their practices, there will be no gaps in pedagogical preparedness for EfS. This also agrees with Rieckmann (2022), who explained that the kind of pedagogical transformation is needed that equips preservice teachers with the skills to foster critical and futures thinking in their learners. This is also affirmed by Sterling (2011) and Lotz-Sisitka et al. (2015), who indicated that transformative pedagogies such as problem-based, experiential, and participatory learning are central to EfS integration. However, their successful implementation depends on educators' own understanding and commitment, which was inconsistently demonstrated in this study. This seems to be lacking and has been identified as a gap that needs to be filled to influence preservice teachers in embedding EfS into the teaching and learning process.

6.3. Institutional Barriers and the Role of Policy Alignment

The participating lecturers highlighted the absence of guidance or incentives to embed EfS meaningfully into their teaching. This is due to a lack of a coordinated institutional strategy or policy on EfS. This reflects a broader systemic issue in higher education and limits preservice teachers' ability to integrate EfS into their teaching. This concurs with Buchanan (2021), who found that weak policy articulation and poor institutional coherence often limit the mainstreaming of sustainability in teacher education. Moreover, failure to integrate EfS is influenced by national policies that appear to lack strong linkages to international frameworks, such as the UNESCO roadmap for ESD (2020–2030). It was also identified that the National Policy Development Framework 2020 warns against data-poor, opinion-driven decision-making in education policy. Hence, a structured institutional response, informed by empirical evidence and aligned with global goals, is necessary to support educators and students alike.

6.4. Preservice Teachers' Motivation as a Lever for Change

The study revealed a strong awareness and interest in sustainability among preservice teachers, despite systemic limitations. Both lecturers and preservice teachers expressed a strong willingness to deepen their knowledge of sustainability. Preservice teachers were particularly motivated by real-world examples and interdisciplinary linkages. This indicates a readiness that could be harnessed through intentional curriculum redesign. The findings are mainly encouraging and suggest fertile ground for transformative change in EfS integration. This concurs with Mochizuki and Bryan (2015), that when preservice teachers are guided through a structured, competency-based curriculum, they can become agents of change in their future classrooms. The preservice teachers' openness to exploring sustainability issues, coupled with their desire for practical teaching strategies, indicates a readiness that teacher education programs can harness. As such, the incorporation of the five UNESCO key competencies, systems thinking, anticipatory competence, normative competence, strategic competence, and collaboration, should be prioritized and scaffolded through targeted modules and experiential learning opportunities.

6.5. Standardization and High-Stakes Testing

The findings show that EfS enhances student achievement (Parry & Metzger, 2023). This is because education is currently focused on standardization and high-stakes testing, resulting in a narrow view of what counts as teaching and learning for sustainability. This is supported by Jeronen (2023), who explained that there is a lack of conceptual clarity and consensus emerging around EfS as an interdisciplinary concept, or a shared understanding of what it entails, making integration fragmented or insignificant to them. On the one hand, it might be that lecturers have not received specific training in the concept, leaving them feeling ill-equipped to incorporate sustainability into their teaching. Hence, preservice teachers may not develop critical competencies in sustainability, thereby undermining the transformative goals of EfS and limiting their meaningful engagement with real-world sustainability issues (UNESCO, 2017). Without EfS, educational institutions may continue to reinforce norms and values that are inconsistent with sustainability, such as consumerism, competition, and anthropocentrism.

7. Conclusion

EfS is not integrated into curricula, leading to varied understandings of what it is all about. In many institutions, it is inconsistently embedded across courses. There is also limited exposure for preservice teachers, which underscores missed opportunities for capacity-building. On the other hand, lecturers feel ill-equipped to develop sustainable competencies in preservice teachers, and this reflects pedagogical preparedness gaps for EfS. As preservice teachers are on the front lines of shaping how students understand and act on sustainability, they need to be well prepared and

possess the knowledge and competencies to embed EfS into their teaching. If teacher education remains underprepared, disjointed, or superficial in addressing climate and sustainability issues, it will leave entire generations at risk and ill-equipped to tackle the impending global crises. However, EfS has great potential. It can equip teachers with confidence, leadership, deep content knowledge, and sustained support. Through this, education can become a transformative force in bridging policy and practice, theory and action, and helping learners and societies thrive in a climate-altered world. Effective training for sustainability in teacher education requires a whole-career, whole-institution approach, with preservice and in-service teachers using experiential, interdisciplinary, and critical pedagogies, supported by global initiatives such as UNESCO's ESD roadmap for 2030. Standardization and high-stakes testing were found to influence preservice teachers' achievement, narrowing down what counts as teaching and learning for sustainability. This results in preservice teachers not having developed appropriate competencies for sustainability. Including blended training, peer feedback, and reflexivity can enhance value-based teaching in EfS.

8. Suggestion: Models of Training Preservice Teachers for Sustainability

The ESD for 2030 framework highlights teacher training as the cornerstone of global sustainability education (UNESCO, 2020). It is argued that sustainability starts with teachers. Education for sustainability builds the capacity of preservice teachers across early childhood, primary, secondary, and higher education to strengthen sustainable education. Sustainable education can be integrated into teacher education curricula to ensure that preservice teachers view it as a central teaching competency rather than an add-on. This is supported by Ferreira et al (2019), who showed that embedding EfS into initial teacher education programs through curriculum mapping and critical pedagogy makes it central to teaching and learning. The other model that can be adapted is continuous professional development (CPD), or ongoing professional development, which will help teachers integrate sustainability into subject-specific contexts and whole-institution approaches. This place-based professional development approach engages preservice teachers in system thinking and local ecological issues. Another method is to adapt action-oriented, experiential training, where preservice teachers learn best by doing sustainability, not just by reading about it. They do this through place-based projects, collaborative inquiry, and creating partnerships with communities and non-governmental organizations. This could build teacher self-efficacy and foster long-term change (Biasutti & Frate, 2017). Digital and blended training, which encompasses online platforms for EfS teacher development, is expanding, making training more accessible (UNESCO, 2022). Teacher education can also use reflective practices, that is, journaling, peer feedback, and reflexivity, in EfS training to enhance values-based teaching.

9. Limitations for the Study

The study involved five lecturers and 10 final-year preservice teachers from the Faculty of Education across five departments and cannot be generalized to other faculties. The study also uses a theory that focuses on individual cognitive change rather than social transformation.

Declarations

Author Contributions. The second author wrote the manuscript, while the first author collected the data and reviewed and edited it. All authors have read and approved the published on the final version of the article.

Conflicts of Interest. The authors declare no conflict of interest.

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