International Journal of Learning, Teaching and Educational Research
Vol. 25, No. 2, pp. 1003-1019, February 2026
https://doi.org/10.26803/ijlter.25.2.44
Received Oct 27, 2025; Revised Nov 18, 2025; Accepted Feb 9, 2026

Rethinking Teacher Education for Sustainable Development: Stories from a South African University

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Abstract. This paper examined how a South African university is rethinking teacher education for sustainable development. It emphasised the critical need to re-evaluate pedagogical frameworks to incorporate sustainability into teacher training programmes. Employing a qualitative, interpretive research design rooted in critical theory and social justice perspectives, the study gathered insights through semi-structured interviews with six participants from a South African university. The findings indicated a need to transform learning environments to promote sustainability, integrate Indigenous knowledge systems into the curriculum, incorporate sustainability and innovation into teacher education programmes, and reform these programmes to enhance social justice and equity. This paper recommended that universities promote the integration of education for sustainable development across all disciplines, with a strong focus on experiential learning and community engagement to tackle local sustainability challenges. Additionally, it advocates for ongoing professional development for educators and a revision of assessment strategies to prioritise practical skills, competencies and real-world problem-solving abilities. Ultimately, this study aims to contribute to the discourse surrounding the preparation of future educators, equipping them to foster a culture of sustainability in their classrooms and broader communities.

Keywords: Teacher education; sustainable development; pedagogical frameworks

1. Introduction

The new 2030 Agenda for Sustainable Development, adopted by world leaders at the United Nations Sustainable Development Summit in 2015 (UN, 2015), clearly reflects the urgency to embed the principles of Education for Sustainable Development (ESD) into all levels of education. Despite its commitments to ESD,

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teacher education in many contexts remains insufficiently aligned with the principles and practices necessary to promote sustainability (Mulà & Tilbury, 2025). In South Africa, entrenched inequality and a fragmented education system have hindered the integration of ESD into teacher training, creating a gap between sustainability policies and classroom realities (Dyantyi & Mkabile-Masebe, 2025).

Timm and Barth (2021) argue that many teacher education programmes still rely on traditional pedagogies that fail to prepare educators to address complex sustainability issues such as climate change, social justice, and equitable resource use. This disconnect limits the transformative potential of education and undermines efforts to build more sustainable and just societies (Mulà & Tilbur, 2025). This study explored how a South African university is attempting to rethink and redesign its teacher education programmes to more effectively incorporate ESD. Through focusing on the lived experiences and stories of teacher educators and student teachers, the research aimed to understand the challenges, innovations and opportunities involved in embedding sustainability into teacher education in a meaningful and contextually relevant way.

Cebrián et al. (2020) indicate that ESD has become a central framework in global educational discourse, reflecting an urgent need to equip learners with the knowledge, values and competencies to respond to the complex challenges of sustainability. These include environmental degradation, social inequality and economic instability. Cebrián et al. (2020) declare that this can be achieved by adopting an interdisciplinary approach that combines environmental sciences, social justice and economic literacy. Integrators of sustainability can develop modules that emphasise critical thinking, allowing students to understand the complex interconnections between human activities and environmental changes. This is later supported by Stein et al. (2023), who argue that ESD promotes holistic and interdisciplinary approaches, encouraging learners to think critically, engage in problem-solving and act towards a more sustainable future.

The integration of ESD into all levels of education, particularly through the lens of the Sustainable Development Goals (SDGs), is now widely recognised as essential to fostering systemic change. Academics should incorporate real-world problems and solutions into the classroom, enabling students to learn not only the theory behind sustainability but also its practical applications that they can adopt in their everyday lives (Dyantyi, 2025). There is a pressing need to promote a pedagogical shift that emphasises experiential and participatory learning. For example, Olsson et al. (2022) have pointed out that traditional methods often depend heavily on rote memorisation, which can hinder creativity and engagement. In contrast, Fischer et al. (2022) found that project-based learning and community engagement initiatives allow students to apply their knowledge in meaningful ways while collaborating with peers and the wider community.

Young (2024) aver that university academics can lead students in projects that tackle local environmental challenges, such as waste management and biodiversity conservation, fostering a sense of responsibility and agency. This hands-on approach not only empowers students but also cultivates a community

of active citizens committed to sustainability. Mulà and Tilbury (2025) emphasise the importance of supporting the professional development of educators, arguing that it is crucial for equipping them with the necessary skills and knowledge to teach sustainability effectively. Dyantyi (2025) emphasises that teacher training programmes should include courses focused on sustainability, such as entrepreneurship, along with contemporary teaching strategies to effectively deliver this knowledge. Workshops and ongoing learning opportunities can further assist educators in integrating sustainability into their teaching practices.

Additionally, Mulà and Tilbury (2025) echo this perspective, asserting that fostering networks among educators can create a platform for sharing resources, experiences and innovative teaching methods. By cultivating a dedicated community of educators committed to sustainability, we lay the foundation for a generation of learners who not only understand the challenges our planet faces but are also inspired to drive positive change. Teacher education serves as a vital avenue for integrating ESD into formal schooling, as teachers play a crucial role in shaping students' attitudes and behaviours. According to La Velle et al. (2020), Initial Teacher Education programmes in England are essential in preparing future educators to create learning experiences that embody the principles of sustainability. However, research by Ferguson et al. (2021) indicates that many teacher education institutions have yet to fully adopt ESD.

This hesitance often stems from inflexible curricula, insufficient training for instructors and a predominant focus on content delivery rather than on transformative pedagogy. Consequently, many student teachers graduate with a limited understanding or experience in applying sustainability concepts in their future classrooms (Smith, 2021). To successfully weave ESD into teacher education, it is crucial to wholeheartedly adopt transformative changes that enhance both teaching methods and curriculum design (Timm & Barth, 2021). This integration demands a shift towards innovative pedagogical approaches that encourage critical thinking, creativity and collaborative learning. Dyantyi (2025) asserts that the curriculum must be thoughtfully restructured to integrate sustainability themes, promoting not only knowledge but also a profound understanding of the interconnectedness of social, economic and environmental issues.

Leal et al. (2023) contend that incorporating sustainability into curricula enhances critical thinking and encourages systems-based approaches among students. In the South African context, Lotz-Sisitka et al. (2024) highlight the necessity of transdisciplinary and context-specific pedagogy to effectively tackle local sustainability challenges. Through embracing these transformative changes, we can prepare future educators to inspire and equip their learners to become responsible global citizens. Taimur and Sattar (2020) contended that transformative learning theory, critical pedagogy and experiential learning provide useful foundations for developing ESD-aligned teaching practices.
Transformative learning theory encourages pre-service teachers to critically examine their beliefs, shaping sustainable professional practices. Critical pedagogy, influenced by Paulo Freire, empowers educators to challenge social

injustice through dialogue, particularly in South Africa's unequal and diverse context (Hlatshwayo & Shawa, 2020). Experiential Learning complements this by emphasising the importance of real-life engagement, allowing pre-service teachers to apply theoretical knowledge through community-based projects and reflective activities (Young, 2024).

Together, these approaches advocate for a teacher education model that is transformative, justice-oriented and experience-driven, equipping educators to promote sustainability and social responsibility (Dyantyi & Mkabile-Masebe, 2025). However, the integration of these theories faces challenges due to institutional obstacles, such as inadequate policy support, limited professional development and a reliance on traditional, examination-focused teaching methods. This situation necessitates a re-evaluation of teacher education structures and delivery methods.

In the African context, the adoption of ESD faces specific historical and socio-economic challenges. Countries such as South Africa have made significant policy efforts to address sustainability in education, yet these efforts are frequently undermined by inequity, under-resourced schools, and a legacy of colonial education systems (Mulà and Tilbury, 2025). ESD is often mentioned in national curricula, but its implementation in teacher education remains inconsistent (Young, 2024). There is a need to localise ESD in ways that respond to the lived realities of South African teachers and learners, integrating IKS and community-based approaches to sustainability (Smith, 2021).

Chaleta et al., (2021) highlighted that universities across South Africa are increasingly exploring innovative approaches to incorporate ESD into their teacher education programmes. However, the extent and nature of these initiatives differ significantly from one institution to another, showcasing a diverse landscape of experimentation and adaptation in response to the pressing challenges of sustainability in education. Some faculties of education have launched innovative programmes that incorporate sustainability themes, community engagement, and interdisciplinary teaching (Stein et al., 2023). Nonetheless, these initiatives often lack institutional support, dedicated resources or alignment with national accreditation requirements like Minimum Requirements for Teacher Education Qualifications.

Ferguson et al. (2021) note that many education faculty lecturers feel unprepared to teach ESD due to limited training, insufficient understanding of the 2030 SDGs, and uncertainty about effective pedagogical approaches. This situation highlights a pressing need for ongoing professional development opportunities and comprehensive curriculum reform to better equip educators in this vital area. Recognising the complexity and context-dependent nature of ESD, scholars such as Barak and Wang (2021) are increasingly advocating for qualitative, narrative-based research that highlights the lived experiences of teacher educators and student teachers.

While growing attention has been given globally to integrating ESD into teacher education, limited empirical work has explored how such integration unfolds in the specific socio-political and institutional contexts of the Global South, particularly within South African universities. Much of the existing research focuses on policy frameworks or theoretical models, often overlooking the lived experiences, institutional dynamics and context-specific innovations that shape the implementation of ESD in practice. This study addresses these gaps by examining how one South African university is integrating ESD into its teacher education programmes. By highlighting personal narratives and institutional practices, the study examines the challenges and transformative potential of applying sustainability locally, bridging global ESD goals and teacher education reform in South Africa.

1.1 Study Objective

- To examine how a South African university is rethinking teacher ESD

2. Theoretical Framework

The foundational framework for this paper is rooted in critical theory and social justice perspectives. Originating from the Frankfurt School, critical theory emphasises the analysis of power relationships, social frameworks, and the ideologies that perpetuate social inequalities (Geuss, 1981; Berman, 1989). It scrutinises and contests dominant systems of authority and control (Davidson et al., 2006; Kincheloe & McLaren, 2011). By examining epistemic injustice, critical theory allows researchers to uncover and scrutinise the essential power structures that affect the production, distribution and accessibility of knowledge in educational settings. Lupinacci (2020) argues that this theory exposes biases and inequities that marginalise certain groups and forms of knowledge, enabling critical analysis and guiding pathways toward a more just and equitable education system.

Conversely, social justice frameworks offer a conceptual and ethical foundation for comprehending and addressing social disparities while advocating for justice (Morrow & Weisser, 2012). These frameworks highlight the necessity of equitable access to resources, opportunities, and rights for every member of society (Lukasiewicz & Baldwin, 2017). Social justice frameworks emphasise the importance of recognising and valuing diverse knowledge systems, perspectives and experiences. They serve as a guiding principle for challenging and transforming educational practices that perpetuate marginalisation and exclusion (Mullooly, 2022). This framework is crucial as it promotes inclusive teaching strategies, curriculum updates, and policies aimed at fostering equity, inclusion and the empowerment of marginalised and underrepresented students, thereby tackling the issues of epistemic injustice in education (Hlatshwayo & Shawa, 2020).

In the context of this study, critical theory encourages an examination of the power dynamics and social inequalities present within university teacher education programmes. By applying this lens, we can scrutinise how the existing structures in teacher education either perpetuate or challenge social injustices,

particularly in the context of sustainable development. Ndlovu-Gatsheni (2015) asserts that this framework facilitates an understanding of how dominant ideologies may shape the curriculum and pedagogical approaches, potentially marginalising alternative knowledge systems and perspectives that are vital for fostering sustainability in South African contexts.

Simultaneously, the social justice framework provides a normative foundation for promoting equity and inclusion within the field of teacher education. It emphasises the need for diverse knowledge systems to be recognised and valued, especially those that emerge from local communities and their unique challenges related to sustainable development. Incorporating social justice principles into the curriculum encourages the development of pedagogies that not only address the climate crisis but also empower underrepresented voices, ensuring that future educators are equipped to support all students in achieving sustainable practices.

Linking these theories together permits a critical examination of how teacher education can be re-focused to prioritise equitable access to knowledge and resources, facilitating social change. Through integrating critical perspectives with a commitment to social justice, the study can offer meaningful pathways toward transforming teacher education into a tool for empowering educators who can address the complex sustainability issues facing South Africa today. This synergy supports the development of a more inclusive and just educational system that fully prepares future teachers to engage with and champion the SDGs.

3. Methodological Outline

This section outlines the research design, including the interpretive paradigm, qualitative approach, case study framework, participant selection, data collection and analysis methods and ethical considerations.

3.1 Research Paradigm

This paper employed the interpretive paradigm to explore innovative approaches in teacher education aimed at promoting sustainable development within a South African university, focusing on grasping the subjective meanings and social contexts which individuals perceive and experience (Adil et al., 2022). Scholars in this field argue that social interactions shape our understanding of reality, with meanings being negotiated through these interactions (Thanh & Thanh, 2015).

Researchers have adopted this approach to capture the complexity of social phenomena, acknowledge diverse perspectives and emphasise the importance of context and individual agency. This paper similarly employs the interpretive paradigm, which is based on the belief that social reality is subjective and influenced by individual experiences and societal contexts (ontology). Using this paradigm allowed the researcher to gain deeper insights into teacher education strategies aimed at promoting sustainable development within a South African university.

3.2 Research Approach

This study used a qualitative research approach to explore and understand human experiences, relationships and discussions. According to Creswell (2014), qualitative research is especially effective for investigating questions about the nature, reasons and processes behind specific events. This approach was chosen because it provides a deeper insight into experiences, phenomena and contexts. It allowed the researcher to ask questions that were not easily measurable, leading to a better understanding of human experiences.

3.3 Research Design

This paper utilises a case study research methodology, adhering to a qualitative framework, with an emphasis on a limited number of participants. According to Creswell (2016), a case study research design is an empirical inquiry that explores a contemporary phenomenon within its real-world context, especially when the distinctions between the phenomenon and its setting are indistinct. This method entails a thorough, longitudinal investigation of a single instance or occurrence, commonly referred to as a case. It offers a structured approach to examining events, gathering data, analysing information, and presenting the findings (Creswell & Poth, 2018).

Consequently, the researcher may gain a clearer understanding of why the event occurred as it did and what aspects might warrant further investigation in subsequent research. Case studies are employed across various fields, including social sciences, education and business, to investigate and comprehend intricate issues, processes, or behaviours (Maree, 2019). The objective of case study research is to attain a deep understanding of a situation, capturing the real-life context of an event (Cohen et al., 2011; Kumar, 2011).

In this paper's context, the case study design facilitated a thorough examination of strategies and methods in teacher education aimed at fostering sustainable development at a South African university. This offers rich, contextual insights that are essential for understanding local challenges. Focusing on one university, the case study design enabled the researcher to collect in-depth qualitative data from academic leaders, HoDs, students, and subject advisors, capturing their lived experiences of challenges, strategies, and outcomes.

3.4 Research Site

The study was conducted in a South African university in the Eastern Cape. The university's primary objective as an academic institution is to provide its students with access to high-quality instruction and research opportunities, while also generating and disseminating knowledge to advance society. This setting was intentionally selected because institutions in the Eastern Cape play a critical role in addressing regional developmental challenges, making them well-positioned to contribute meaningfully to conversations about ESD. The university's location is noteworthy because the Eastern Cape Province is among the poorest regions of South Africa, with high unemployment, poverty, and social inequality. It was believed that stakeholders of this institution could help the university formulate strategies for teacher education that promote sustainable development within the South African context.

3.5 Data Collection Procedures

Data were gathered through semi-structured interviews that were conducted in both English and isiXhosa, allowing participants to communicate freely. Creswell (2013) explains that semi-structured interviews are crafted by identifying key topics to be discussed, managing the dialogue to ensure thorough coverage, and posing specific questions. This method is often utilised to gain a profound understanding of responses and to delve into subjects in depth (Denzin & Lincoln, 2011). This approach enabled the researchers to examine the phenomenon being studied from various angles. During the interviews, a voice recorder was used in conjunction with an interview guide that featured important themes and questions. As a result, this method proved highly appropriate for the study, as it improved data quality and validity while providing valuable insights into the participants' experiences and viewpoints.

3.6 Participant Selection

A total of six participants were selected using convenience sampling, a method that allowed the researcher to collect data easily and inexpensively (Dyantyi, 2025). The group comprised two students, two academic lecturers, one head of department, and a curriculum education specialist (CES) who also serves on the faculty advisory board (see Table 1). The variety in the group composition is likely to ensure a well-rounded perspective on the subjects being discussed. Students offer firsthand learning experience, lecturers provide pedagogical expertise, the HoD ensures strategic oversight, and the CES contributes advisory guidance, enabling informed discussion and decision-making.

This diverse representation led to more effective solutions and innovations in the subject under investigation. This type of sampling facilitated quick and efficient data collection, which is particularly beneficial when time or resources are limited. Convenience sampling prioritises the sampling of participants who are readily accessible and willing to participate (Han et al., 2021), thereby ensuring ease and efficiency of data collection. The sampled participants were invited to share their insights about fostering effective parent-teacher collaboration that would benefit learners' academic success. This approach also aimed to create a friendly atmosphere and minimise power imbalances between the participants and the researchers. The following table presents the biographical information of participants.

Table 1: Biographical Information of participant

Name assigned to participant	Gender	Age	Qualification	Years of experience	Current position
P1	Male	46	M Ed	12	Lecturer
P2	Female	48	M Ed	20	HoD
P3	Male	57	BA Ed	31	CES
P4	Female	40	PhD	14	Senior Lecturer
P5	Male	26	2nd Year student	NIL	Student
P6	Female	25	4th Year student	NIL	Student

Source: Author's computation

3.7 Data Analysis

The collected data were analysed using a thematic approach. Thematic analysis is a technique used to identify, organise, and provide insights into significant patterns (themes) within a dataset (Braun & Clarke, 2006). This analysis followed Braun and Clarke's (2006) six-phase framework, starting with familiarisation through repeated readings of the interview transcripts. Initial codes were generated and organised into potential themes, which were then reviewed, refined and clearly defined. Finally, the themes were interpreted and presented, accompanied by supporting quotations from participants, to illustrate the key findings.

The researcher chose this method because it allows for the understanding of collective or shared meanings and experiences. Thematic analysis serves as a valuable tool for conducting research that may otherwise appear ambiguous, complex or difficult to grasp. It offers a structured approach to categorising and systematically examining qualitative data, which can then be linked to broader theoretical or conceptual concerns (Braun & Clarke, 2019). This method was employed to analyse the data collected from the respondents, enabling researchers to identify common elements in the qualitative data and gain a deeper understanding of them.

3.8 Data Trustworthiness

To ensure the trustworthiness of the data, the study implemented several rigorous procedures addressing dependability, credibility, confirmability, and transferability as outlined by Creswell (2013). Dependability was ensured through a detailed documentation of the research process, including data collection methods, coding procedures and decision trails, allowing for potential replication.

Credibility was established through prolonged engagement with participants, triangulation of data sources and member checking, wherein participants reviewed the accuracy of interpretations. Confirmability was achieved by maintaining an audit trail of all research activities, engaging in reflexive journaling to minimise researcher bias, and conducting peer debriefing to validate findings. Finally, transferability was supported by providing rich, thick descriptions of the research context, participants, and settings, enabling readers to assess the applicability of findings to other contexts.

3.9 Ethical Procedures

All ethical protocols were carefully followed, including securing informed consent, ensuring participation was voluntary, protecting participant anonymity, maintaining confidentiality and preventing any harm to participants. The researchers adhered to all ethical guidelines during the study and received approval under protocol number FEDREC15-06-23-3 from their institution. They also acquired permission from the Eastern Cape Education District to evaluate subject advisors. Gatekeepers were involved to help access the research sites and participants. Participants were assured that their data would be used solely for research purposes, with a strong commitment to upholding informed consent and confidentiality throughout the process.

4. Findings/Results and Discussion

4.1 Teacher ESD

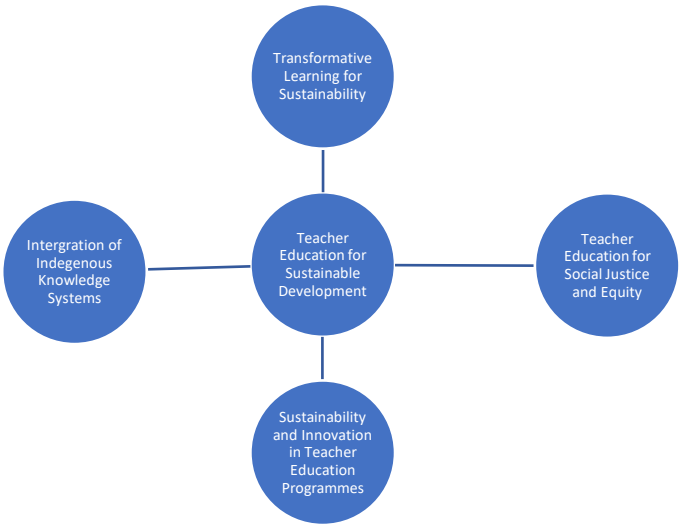

Figure 2: Source: (Author's own work)

4.2 Transformative Learning for Sustainability

Transformative learning for sustainability emphasises the need to rethink education in a way that fosters critical thinking and encourages individuals to engage with environmental challenges. It aims to inspire actionable solutions and promote a sustainable future through innovative learning experiences.

Participants responded that:

> *''We need to improve our curriculum by including sustainability topics in a better way. Instead of just adding these topics, we should change how we teach to make it more interactive, use local knowledge and help students think about their own impact on sustainability issues. This will help students connect more with the material and feel more responsible''(P1).*
>
> *Working with the community can make you think about your own beliefs and advantages; it might feel uncomfortable at times, but it's important. Try to welcome this change, as it can help you see things differently and encourage you to teach in fairer and more responsive ways''(P4).*

The findings presented indicated that integrating sustainability topics into the curriculum necessitates a shift towards more interactive teaching methods that leverage local knowledge and engage students in reflecting on their personal impact. Collaborating with the community can challenge existing beliefs and foster discomfort, which is essential for promoting growth and understanding. Embracing this approach can lead to more equitable and responsive educational practices. There is an urgent need to advocate for a pedagogical shift that prioritises experiential and participatory learning.

For instance, Olsson et al. (2022) highlight that traditional teaching methods often rely heavily on rote memorisation, which can stifle creativity and engagement. In

the same vein, Fischer et al. (2022) found that project-based learning and community engagement initiatives allow students to apply their knowledge in meaningful ways while collaborating with peers and the broader community. University academics can guide students in projects that address local environmental challenges, such as waste management and biodiversity conservation, thereby fostering a sense of responsibility and agency. This hands-on approach not only empowers students but also nurtures a community of active citizens committed to sustainability.

4.3 Integration of Indigenous Knowledge Systems (IKS)

The infusion of IKS into the university curriculum enhances our understanding and stewardship of the environment by integrating traditional wisdom with contemporary practices.

Participants responded that:

> *''Teacher education should include lessons about Indigenous Knowledge. Understanding local practices, like how communities save water and farm together, helps future teachers see that valuable knowledge comes from our environment, not just from textbooks''(P2).*
>
> *''It's important for teacher training to highlight local cultures and traditions. Learning about things like rainmaking rituals and traditional ways of caring for the land shows that sustainability is part of our heritage''(P3).*
>
> *''Teacher education should encourage sharing stories about how local communities use nature to decide when to plant crops. These examples connect students to their surroundings and help them feel a sense of belonging'' (P5).*

The findings underscored the significance of incorporating Indigenous Knowledge into teacher education curriculum, highlighting that local practices related to sustainability and environmental stewardship are essential for future educators. By emphasising cultural traditions and community practices such as rainmaking rituals and the timing of agricultural activities, the curriculum nurtures a sense of belonging and connection to the environment. This approach transforms the understanding of knowledge from a purely academic viewpoint to one that appreciates experiential and community-based learning.

Ultimately, this integration enhances teacher training and fosters a comprehensive understanding of sustainability as an integral part of cultural heritage. These findings align with those of Smith (2021), who contends that there is a necessity to localise ESD in ways that address the lived realities of South African teachers and learners, incorporating IKS and community-based approaches to sustainability. Incorporating Indigenous Knowledge into teacher education not only enriches the curriculum but also fosters a deeper connection to sustainability as part of cultural heritage. This holistic approach is vital for preparing educators to address the realities of their communities.

4.4 Integrating Sustainability and Innovation into Teacher Training Programmes

The integration of sustainability and innovation into teacher training programmes is essential for preparing educators to address contemporary challenges.

Participants responded that:

> *"I think it's a great idea to have courses on sustainability in teacher training. It will help us learn how to teach our students about important issues like the environment and starting their own businesses." (P5)*

> *''I suggest creating a network for teachers to share ideas and resources. This would allow us to learn from each other about effective ways to teach sustainability in our classrooms'' (P6)*

The findings underscored the importance of integrating sustainability-focused courses, such as environmental education and entrepreneurship, into teacher training programmes. They also highlighted the necessity for collaborative professional networks that facilitate knowledge sharing and pedagogical innovation. Leal et al. (2023) argue that incorporating sustainability into curricula promotes critical thinking and systems-based approaches among students. This notion is further reinforced by Dyantyi (2025), who emphasises the need for teacher training programmes to include sustainability-oriented courses, such as entrepreneurship, alongside contemporary pedagogical strategies for effectively delivering this content. Workshops and ongoing learning opportunities can support educators in embedding sustainability within their teaching practices.

Additionally, Mulà and Tilbury (2025) echo this sentiment, asserting that developing networks among educators can provide a platform for sharing resources, experiences and innovative teaching methods. Integrating sustainability into teacher training and fostering collaborative networks are crucial for nurturing future educators who are equipped to inspire systemic change. Through prioritising these initiatives, we can cultivate a generation of learners prepared to address pressing environmental challenges.

4.5 Transform Teacher Education Programme for Social Justice and Equity

Teacher education programmes should emphasise the importance of social justice and equity in education, equipping future educators with the tools to foster inclusive and equitable learning environments. Participants responded that:

> *''Our teacher education programmes should help future teachers understand fairness and justice. We must prepare them to deal with real-life problems like poverty, inequality and climate change in their classrooms'' (P2).*

> *"We need to learn how to teach in a way that includes everyone. Sometimes the training only focuses on one way of thinking, but we must also learn from local communities and different cultures." (P5).*

> *''Our teacher education programmes should help future teachers understand fairness and justice. We must prepare them to deal with real-life problems like poverty, inequality and climate change in their classrooms'' (P4).*

The findings underscored the significance of equipping future educators with a comprehensive understanding of fairness and justice to effectively address pressing societal issues such as poverty, inequality and climate change. They emphasise the necessity for inclusive teaching approaches that incorporate diverse perspectives and input from local communities. This suggests that teacher education programmes should expand beyond traditional training methods to encompass a more comprehensive understanding of education. These findings align closely with the critical and social justice frameworks that underpin this study, demonstrating how critical theory enables researchers to uncover and analyse the fundamental power structures influencing the production, distribution and accessibility of knowledge within educational contexts.

This theory provides a perspective for analysing the biases, exclusions, and inequalities that marginalise certain groups and their knowledge, enabling critical reflection on the current situation and the exploration of ways to create a more just and equitable educational system. In contrast, social justice frameworks offer both a theoretical and moral foundation for understanding and addressing social inequalities, while advocating for fairness (Morrow & Weisser, 2012). These frameworks emphasise the crucial need to ensure that all members of society have equitable access to resources, opportunities, and rights (Lukasiewicz & Baldwin, 2017). Additionally, social justice frameworks stress the importance of acknowledging and appreciating diverse systems of knowledge, perspectives and experiences.

6. Conclusion

Rethinking teacher ESD is essential for addressing the pressing challenges of our time, particularly in the South African context. By embracing transdisciplinary pedagogies (bridging disciplinary boundaries and involving real-world stakeholders) and integrating ESD across all disciplines, universities can better prepare future educators to navigate complex sustainability issues. Fostering critical thinking, experiential learning, and community engagement not only enhances the educational experience but also empowers students to become active participants in creating a more sustainable and equitable society. As we move forward, it is imperative that teacher education programmes bridge the gap between policy intentions and classroom practices, ensuring that sustainability principles are meaningfully embedded in teacher training. This holistic approach can catalyse the transformative potential of education, ultimately contributing to a more just and sustainable future.

7. Recommendations

There is a growing necessity for universities to adopt ESD across all academic programmes, not just those focused on environmental studies. This initiative has the potential to enhance students' understanding of sustainability, regardless of their discipline, whether it be law, health sciences, engineering or business. An integrated teaching approach that combines various fields can effectively address complex sustainability challenges, promote critical thinking and helping students recognise the interconnectedness of environmental, social and economic issues.

Educational programmes should be tailored to reflect the specific sustainability challenges encountered by local communities, ensuring that teacher education remains relevant and practical. This approach prepares future educators with the skill set required to engage with real-world issues. Moving beyond rote memorisation towards experiential and participatory learning methods can greatly benefit students. Incorporating project-based learning and community engagement initiatives allows students to apply their knowledge in real-world scenarios, fostering creativity, critical thinking and a sense of agency.

Continuous training and development opportunities for educators in sustainability topics and effective teaching methods can empower them to skilfully integrate sustainability into their curricula and classroom practices. Collaboration among students, educators and local communities is vital to tackle sustainability challenges. Group projects and initiatives can strengthen teamwork and community involvement. Additionally, revising assessment strategies to evaluate competencies and skills essential for addressing sustainability challenges can provide a more comprehensive view of students' understanding, emphasising both theoretical knowledge and practical application.

8. Limitations of the Study

The present study is limited by its small sample size of six participants, which restricts the generalisability of the findings and may not fully capture the diversity of perspectives among teacher educators in South Africa. The qualitative, interpretive methodology, while valuable for generating in-depth insights, relies heavily on subjective interpretation, which may introduce researcher bias. Additionally, the use of purposive sampling, although appropriate for selecting participants with relevant expertise in ESD, limits the inclusion of alternative or contrasting viewpoints from educators who are less engaged in sustainability practices.

The study's focus on a single South African university further constrains the applicability of the results to other institutional or national contexts. These limitations underscore the need for future research to employ larger and more diverse samples, mixed-methods design, and multi-site comparisons to provide a broader and more comprehensive understanding of how sustainability can be effectively integrated into teacher education.

9. Direction for Future Studies

Future studies should build on these findings by employing larger and more diverse samples that capture a wider range of teacher educator perspectives across multiple South African universities and, where possible, international contexts. Incorporating mixed-methods designs would help strengthen the evidence base by combining the depth of qualitative insights with the breadth and generalisability offered by quantitative approaches.

Future research should also consider including participants with varying levels of engagement in sustainability to reveal contrasting viewpoints and identify potential barriers to integrating ESD in teacher education. Multi-site comparative

studies, longitudinal designs and intervention-based research could further illuminate how institutional cultures, policy environments and pedagogical practices shape the effective integration of sustainability into teacher education programmes.

10. Acknowledgements

I sincerely thank, the Walter Sisulu University Directorate of Research and Innovation for their unwavering support and motivation, which enabled the publication of this article through funding. Additionally, the participants played a crucial role in helping us reach meaningful conclusions for this investigation.

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