



Quality education for sustainable development: Perceptions of technical, vocational, education and training leaders

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ABSTRACT

Article History

Received: 17 February 2025

Revised: 20 January 2026

Accepted: 13 February 2026

Published: 2 April 2026

Keywords

Capacity building
Curriculum integration
Ehlanzeni TVET College
Educational leadership
Quality education for sustainable development
Sustainability
TVET.

In a world increasingly driven by the need for sustainable solutions, education stands at the forefront of global transformation. At the heart of this effort is the role of TVET institutions, which have the power to equip the next generation with the skills and knowledge necessary to drive sustainable development. With a focus on Sustainable Development Goal 4 (SDG 4), which seeks to achieve inclusive, equitable, and high-quality education for all by 2030, this study investigates how TVET leaders perceive their role in integrating sustainability into their institutions. A qualitative research study revealed how the leaders address key challenges such as outdated curricula, limited resources, and inadequate institutional capacity, which hinder the alignment of TVET programs with sustainable development goals. Furthermore, it examines the strategies employed by these leaders to overcome these barriers and promote Quality Education for Sustainable Development (QESD), including greening TVET colleges, integrating sustainability into curricula, and adopting innovative teaching methods. The importance of continuous curriculum assessment is clear; aligning programs with sustainable development requires responsiveness to current economic and social shifts, which is one of the goals of TVET leaders. This study will contribute valuable insights for policymakers, educators, and TVET institutions seeking to align educational programs with sustainable development objectives in South Africa and beyond.

Contribution/Originality: This study's originality lies in generating empirical, context-specific evidence from Ehlanzeni TVET educational leaders on how QESD is actually interpreted, constrained, and operationalized at campus level. By integrating leaders' perceptions with document insights, it contributes a practice-oriented leadership lens and actionable strategies (curriculum renewal, greening, partnerships) to strengthen SDG4-aligned TVET policy and implementation.

1. INTRODUCTION

The global importance of education, especially Technical and Vocational Education and Training (TVET), in promoting sustainable development is well-recognized. Education, as both a basic human right and a crucial tool for sustainable development, empowers individuals and societies to address and solve the world's significant challenges (Shava, Hleza, Mathonsi, Shonhiwa, & Hlabangana, 2021). The United Nations' Sustainable Development Goals (SDGs) highlight the crucial role of quality education in achieving sustainable development across all dimensions. SDG 4 specifically emphasizes providing inclusive, equitable education of high quality and fostering lifelong learning opportunities for everyone (United Nations, 2015). Quality education goes beyond traditional learning; it equips

individuals with the skills, attitudes, and values necessary to lead productive lives, make informed decisions, and contribute positively to society (González García, Colomo Magaña, & Cívico Ariza, 2020).

In South Africa, TVET institutions play a crucial role in equipping individuals with the skills needed to drive social progress, economic growth, and environmental protection. To successfully incorporate sustainability principles into TVET educational curricula, it is crucial to adopt innovative teaching methods and curriculum development strategies (Vilmala, Karniawati, Suhandi, Permanasari, & Khumalo, 2022). Embedding sustainability principles within educational programmes is very important (Shulla, Filho, Lardjane, Sommer, & Borgemeister, 2020). However, ensuring that quality education aligns with sustainable development goals presents challenges for educational leaders. The TVET colleges at Ehlanzeni district in Mpumalanga province, South Africa, have a complex educational landscape. These challenges include socioeconomic inequalities, limited resources, and teacher shortages (Pramjeeth, Nupen, & Jagernath, 2023). Ogur (2023) concurs that a primary challenge confronting TVET programmes is insufficient funding, which makes securing resources difficult. The scarcity of financial resources and the resulting lack of infrastructure investment critically undermine the capacity of TVET institutions to deliver relevant and high-quality education (Ayub, Khan, Zafar, & Hussain, 2022).

Looking at these issues, there is a need for educational leaders to promote quality education as a sustainable goal. Qablan, Alblooshi, and Alkaabi (2023) highlight the importance of school leadership in promoting ESD, emphasizing the need for leaders to embed sustainability in educational practices strategically. This study aims to understand how South African TVET leaders perceive and implement sustainable development principles within their institutions. Specifically, the research will explore how these leaders conceptualize and deliver quality education that contributes to sustainable development. The study navigates how TVET education leaders are overcoming challenges of curriculum design and development, institutional capacity, policies and resources, and technological barriers that hinder QESD (Shava, 2020). According to Siebrits and Van De Heyde (2019), limited digital tools can also hinder the implementation of QESD in TVET institutions.

By investigating their experiences and perspectives, the study aims to identify the challenges these leaders face and the strategies they use to promote sustainability-oriented education in the TVET sector. It is essential for TVET institutions to actively advocate for the sector's sustainability, emphasizing the importance of demonstrating TVET's relevance and impact on sustainable development (Nkambule & Ngubane, 2023). By examining the perspectives of educational leaders in Ehlanzeni, this study aims to contribute to the ongoing conversation about strengthening the role of TVET institutions in sustainable development. Understanding these perceptions can help inform policy and practice, ensuring that sustainable development becomes a core part of TVET education. The research addresses the primary question: "What are the perceptions of Ehlanzeni TVET educational leaders on quality education for sustainable development in South Africa?"

2. RESEARCH METHODOLOGY

A qualitative method was employed, which aims to uncover the subjective perspectives of individuals or groups on a social problem (Creswell & Poth, 2018). Qualitative research is primarily concerned with gaining deep insights into complex social phenomena, focusing on understanding how people interpret their experiences. The primary tools for gathering data include interviews, focus groups, observations, and document analysis (Merriam & Tisdell, 2016). This approach is interpretive and flexible, allowing exploration of participants' lived experiences within their specific contexts (Flick, 2022).

The purpose of using qualitative methodology is to explore QESD within the TVET sector in South Africa. The use of a qualitative approach in this study allowed researchers to explore the identified subject matter in-depth, focusing on how TVET educational leaders understand and navigate sustainable development (Tenny, Brannan, & Brannan, 2017). The richness of qualitative data enables exploration of the *how* and *why* behind leaders' perceptions related to QESD (Creswell & Poth, 2018). The study aims to explore perceptions of TVET educational leaders and

the challenges of aligning their programmes with QESD. Qualitative research is well-suited for this aim as it provides a platform to explore the multiple perspectives and interpretations that TVET educational leaders may have, shaped by their unique experiences and environments (Yin, 2020).

2.1. Sampling

Given the exploratory nature of the research, purposeful sampling was employed to effectively address the study's objectives. Purposeful sampling, a technique adopted for this study, was based on the submission of Tenny et al. (2017), who indicate that purposeful sampling is commonly associated with qualitative research, involving selecting participants who are particularly well-suited to provide relevant insights into the research topic. This method is especially useful when the goal is to gain a deep understanding of specific phenomena from individuals with relevant experience and knowledge (Savin-Baden & Howell Major, 2013).

In this study, seven TVET education leaders with a minimum of five years of leadership experience were selected from seven campuses of Ehlanzeni TVET and the college curriculum manager to be interviewed. The rationale for this selection was twofold: the participants' extensive experience in leadership roles and their ability to provide information-rich perspectives on QESD. Purposeful sampling allowed for the inclusion of participants who not only met the experience criteria but were also anticipated to provide rich, detailed information pertinent to the study's focus on QESD in the TVET context. This is in accordance with the work of Creswell and Creswell (2018), who state that purposeful sampling involves selecting individuals or groups that are especially knowledgeable or experienced with a phenomenon of interest, ensuring that the research captures in-depth and meaningful insights tailored to the study's objectives.

3. PRESENTATION OF FINDINGS

The findings of the study are presented using themes and sub-themes as shown in Table 1.

Table 1. Themes and sub-themes.

Themes	Sub-themes
1. Perceptions of TVET educational leaders on QESD	<ul style="list-style-type: none"> • Understanding quality education for sustainable development • Key elements contributing to QESD in TVET
2. Challenges in integrating sustainable development into TVET curriculum	<ul style="list-style-type: none"> • Integration of sustainable development in TVET programmes as a challenge (Curriculum constraints) • Funding limitations • Limited infrastructure and resources
3. Strategies for overcoming challenges	<ul style="list-style-type: none"> • Training and development • Industry partnership and community engagement • Implementation of new sustainable programs (occupational programs) • Future strategies (Greening TVET)

3.1. Presentation of Data and Assimilation with Literature

3.1.1. Perceptions of TVET Educational Leaders on QESD: Understanding Quality Education for Sustainable Development

Goal 4 of Sustainable Development aims to ensure accessible, fair, and high-quality education and promote continuous learning for all. It states that everyone should have equal opportunities to receive affordable vocational training, reduce inequality based on gender and wealth, and make high-quality higher education accessible to all (UNESCO, 2019).

Participant 7 agreed by stating that: *"I think with quality education, this is where we ensure or we promote lifelong learning opportunities for all our students. We must also ensure that we give a fair education to our students. By fair education,*

I mean, we should have an encouraging, environment in which academic decisions are based on excellence and achievements over and above with any potential bias we must avoid a potential bias”.

In further defining quality education for sustainable development, according to the participants. Contrary to participant 3, who said, *“I think quality education should encompass all, what can I say, maybe first one needs to understand the sustainable development goals as set by UNESCO. So, one needs to first understand that. But looking at sustainable development, particularly at Ehlanzeni TVET College. I think our college is a little behind in terms of us aligning ourselves with sustainable development”.* The literature suggests that TVET educational leaders often view QESD as a tool to prepare learners with the necessary skills and knowledge for both personal and societal growth. Ebersold and Schmitt (2021) highlight that equity in vocational education is critical for ensuring marginalized groups, such as women and disadvantaged communities, have equal access to the benefits of sustainable development and can contribute to it.

Moreover, TVET leaders are becoming more aware of the importance of aligning their curriculum with national development plans, as noted by Tikly (2023). This aligns with one of the participants, where quality education is seen as a process of supporting the country’s broader development goals through well-structured programs that meet economic needs. According to Tikly (2023), TVET must address local and national economic challenges by providing relevant skills that enhance employability and innovation, especially in developing countries where vocational training plays a critical role in economic development.

The TVET Strategic Development Plan and Curriculum Framework explicitly support Quality Education for Sustainable Development (QESD) by aiming to equip learners with skills for personal and societal growth. Qiong, Kamis, Mei, and Rus (2022) agreed that education for sustainable development is more of a practical approach and also lifelong education, which is a holistic approach involving all stakeholders: parents, communities, businesses, and government, who are involved in covering all aspects of society. Educators are needed to work with parents, businesses, communities, and governments in education.

3.1.2. Key Elements Contributing to QESD in TVET

To identify key elements, one needs to understand the foundational concepts of quality education for sustainable development. Sustainable development and Education for Sustainable Development are global issues that various countries are addressing, with some activities becoming similar across nations (Qiong et al., 2022). Embedding principles of ESD in institutional curricula goes beyond teaching subjects related to sustainability; it involves participatory and transformative learning processes that empower individuals to drive change (Shava, Mkwelie, Ndlovu, & Zulu, 2023). The participants stated, among others, curriculum alignment, industry alignment, competent academic staff, availability of funds, and adequate resources.

Participant 2 reported that: *“I believe the main thing or the main things that I will highlight, one of them would be the issue of our curriculum alignment. If we have the curriculum that is aligned to our social development plan that is done at a national level.”* Participant 6 reported that: *“So funding, to me, is the main key element that will help to drive the programs and also to fund the students and assist them to be part because as we are looking to quality education, we are looking at education that can accommodate everyone.”* As well as participant 3 stated that: *“But maybe second, it would be in our lecturers. Are all our lecturers qualified? Do all of them have pedagogy or methodology in teaching TVET qualifications? That would be another thing. Do we have resources, in terms of infrastructure, in terms of our workshops, are our workshops accredited?”*

In the literature, Berchin, de Aguiar Dutra, and Guerra (2021) emphasize that TVET institutions must embed sustainability principles across all aspects of their operations to foster a culture of sustainability. Hence, TVET leaders understand the importance of embedding sustainability principles within the college.

The findings indicate that leaders face the following challenges in integrating sustainable development into TVET curriculum.

3.1.3. Integration of sustainable development in TVET programmes as a challenge.

TVET institutions are considered ideal for implementing QESD; however, many lack clear frameworks and guidelines on integrating QESD principles with their existing programmes, which hinders effective implementation and integration of sustainable development principles within their educational offerings (Mutebi & Kiplagat, 2022). Ehlanzeni TVET leaders have stated their perceptions and practical experiences in the integration of sustainable development into their programmes.

According to participant 6: *"We are a little bit behind with integration for now because, when we look at the programs we have, they are old, historical programs. The college is starting to move now, but at a slow pace."* Participant 3 agreed, reporting that: *"Participant 3: It's no secret that some of the curricula we're offering are actually outdated. I'm glad that, you know, the Report 191 program, N1, N2, N3 has been phased out. You know, in favor of occupational programs, I think that will also help. But in some of the programs, we are still lagging behind."*

When it comes to integrating Sustainable Development into TVET programmes, most participants mention challenges faced by them as leaders. Participant 5 reported that: *"I will say internal policies are not supporting the change required, as I've said that you find the college offering the programs that they have been offering since the early 80s, when the campus was opened. I'm not sure whether this is because of the lack of funds, or if that is the prescription given to the college on what to offer."*

Literature states that TVET professionals should be involved in updating the TVET curriculum to focus on sustainability, while also incorporating the six R principles of Reduce, Reuse, Renew, Recycle, Repair, and Rethink (Majumdar, 2009). Participant 6 noted, *"The curriculum is still a little bit old... we need to address those issues that we are facing as a society, as a country as a whole,"* emphasizing the necessity for a curriculum overhaul to align with the principles of sustainable development.

The integration of Sustainable Development Goals (SDGs) into the curriculum of TVET colleges in South Africa is significantly hampered by existing curriculum constraints. Despite the potential of TVET institutions to implement Quality Education for Sustainable Development (QESD), many face significant barriers, including a lack of clear frameworks and guidelines for integration (Mutebi & Kiplagat, 2022).

The following challenges were also reported by participants during interviews as obstacles that limit or hinder integrating sustainable development into the curriculum. Some difficulties include inadequate infrastructure, limited access to technology, outdated TVET course content compared to market demands, and the misalignment between TVET programs and sustainable development objectives (Shava, Makokotlela, & Hebe, 2020).

TVET documents, such as the Institutional Policy Framework and Curriculum Review Reports, reveal critical alignment issues with integrating Sustainable Development Goals (SDGs) due to existing curriculum constraints, corroborating the challenges faced in implementation, Mutebi and Kiplagat (2022) observations. These documents show a lack of structured guidelines for embedding Quality Education for Sustainable Development (QESD), highlighting barriers similar to those identified by participants in interviews, such as insufficient infrastructure, limited technology access, and the need for curricula that better respond to market demands. Moreover, the Curriculum Review Reports specifically address the gap in aligning current TVET programs with SDGs, reinforcing Shava et al. (2020)'s findings on challenges that hinder sustainable development integration. This alignment gap highlights the need for curriculum adjustments and resource allocation to enable TVET colleges to effectively support sustainable development goals in their educational offerings.

4. FUNDING LIMITATIONS

For programmes to be implemented and an institution to function properly, availability of funds is a requirement. Inadequate funding may hinder the success of the implementation process. Funding plays a crucial role in influencing various aspects of an education system. Key elements like access to education, teacher salaries, and infrastructure are all significantly impacted by the availability and distribution of financial resources (Zickafoose et al., 2024).

Participant 8 reports that: *“While Ehlanzeni TVET has made significant strides in promoting Quality Education for Sustainable Development, several challenges continue to hinder full alignment with sustainability principles, which include lack of funding and resources. Implementing sustainable development programs requires significant investment in modern infrastructure, renewable energy systems, and sustainable materials.”*

Participant 1 supported by stating that: *“I think the first one, ma'am, is the limited resources in terms of infrastructure, equipment, and funding. Because most of these programs require infrastructure. For example, I talked about occupational programs. You need to have relevant workshops that will be able to accommodate those students.”*

The participants reiterate the lack of funds as a major challenge in offering new programs and maintaining existing ones. This is supported by literature from Ogur (2023), who claims that a primary challenge confronting TVET programs is insufficient funding, which can be difficult to secure. The Agenda for Sustainable Development, along with Education 2030, requires significant financial commitment from the government. However, financial challenges often hinder progress toward achieving SDG 4 (Pramjeeth et al., 2023).

Funding limitations are a critical barrier to the successful implementation of quality education for sustainable development in TVET institutions. This perspective aligns with recent literature emphasizing that sustainable development initiatives in education often require substantial investments in infrastructure, green energy systems, and sustainable materials (UNESCO, 2019).

TVET documents, such as the Financial Strategy Report and the Program Development Budget, highlight funding constraints as a primary barrier to expanding and maintaining programs, aligning closely with Ogur (2023) findings. These documents detail the financial challenges TVET institutions face in meeting the requirements of the Agenda for Sustainable Development and Education 2030, echoing (Pramjeeth et al., 2023) assertion that governmental financial support is often insufficient for achieving SDG 4.

4.1. Limited Infrastructure and Resources

Infrastructure and resources play a vital role in programme offerings; limited or lack of these resources can hinder the integration of sustainable development into programmes. The outcomes from the TVET leaders' data gathering concur with this. *Participant 1: “I think the first one, ma'am, is the limited resources in terms of infrastructure, equipment, and funding. Because most of these programs, they require infrastructure. For example, I talked about the occupational programs. You need to have the relevant workshops that will be able to accommodate those students.”*

Participant 3 supported: *“Because the college doesn't receive enough grants to enable it to buy or procure all the equipment necessary to offer programs that are in line with our Sustainable Development Goals. So that again is a very big challenge.”* *Participant 5: “Apart from the lack of funding, I will go to the issue of infrastructure. There's insufficient infrastructure on our campus, even though we have many programs that we want to offer.”* *Participant 8 stated the cause of poor infrastructure and resources: “While there are policy frameworks in place, the lack of practical government assistance in terms of grants or resources for sustainability programs creates challenges.”*

Participant 1 articulated this concern, noting, “the limited resources in terms of infrastructure, equipment, and funding” hinder the ability to adequately deliver occupational programmes that align with sustainable development goals. This observation resonates with existing literature highlighting how insufficient infrastructure can impede the effective implementation of educational programs, especially in the context of sustainability (McGrath, 2018; Ogur, 2023).

Furthermore, Participant 3 echoed this sentiment, stating, *“the college doesn't receive enough grant to enable it to buy or procure all the equipment necessary to offer programs that are in line with our Sustainable Development Goals.”* This implies the critical role of financial resources in securing the necessary equipment and facilities for effective teaching and learning.

4.2. Strategies for Overcoming Challenges

4.2.1. Training and Development

To overcome challenges faced in integrating sustainability into the curriculum, staff training is necessary to enable the offering of new programmes.

Participant 2 reported that: *“The most significant challenges that I can highlight, number one, will be the issue of re-skilling our staff members. Remember, we are the old teachers. The issue of re-skilling our staff members, because remember, yes, we have qualified lecturers, qualified teachers, but the methodology that the ones that were taught then, it was never in line with the current, I would say, the current technological way, the mode of delivering our lessons.”* Participant 7 supported by stating that: *“I think as a lecturer or as a leader, you must do a continuous, uh, professional development. Because in that way, you’ll be able to ensure a quality education.”*

The integration of sustainability into the curriculum of Technical and Vocational Education and Training (TVET) institutions hinges significantly on effective staff training and development. As noted by Participant 2, *“the most significant challenges...will be the issue of re-skilling our staff members.”* This reflects broader concerns in the literature regarding the need for continuous professional development to ensure that educators are equipped to deliver contemporary, relevant curricula (Mokhele, Kritzing, & Mosito, 2022). Inadequate training not only affects the delivery of educational content but also hampers staff's ability to engage effectively with sustainability principles.

The "Skills for Employability and Sustainable Development" document, part of South Africa's national TVET strategy, emphasizes training and development as a primary approach to achieving Quality Education for Sustainable Development (QESD) within TVET colleges. This document highlights continuous professional development (CPD) for educators, promoting skills that align with sustainability and industry demands, ensuring that educators are equipped to deliver relevant, forward-thinking content. The Department of Higher Education and Training (DHET) values the importance of training programs that incorporate green skills, encouraging TVET institutions to focus on renewable energy, waste management, and sustainable technologies as part of the curriculum.

Additionally, the DHET's "Greening TVET Colleges Initiative" guide outlines a structured approach to integrating sustainability into daily teaching practices through workshops and collaborative learning, empowering educators to become change agents in promoting sustainability. This focus on training and development aligns with the broader sustainable development framework, preparing educators to address challenges such as outdated curricula, lack of resources, and limited industry alignment by equipping them with the knowledge and skills necessary to embed sustainable principles in their teaching.

4.2.2. Industry Partnership and Community Engagement

Industry partnerships play a critical role in aligning TVET institutions with industry demands and promoting sustainability in education. Participant 8 reported that Ehlanzeni TVET has established partnerships with industry leaders and local businesses, which allow students to gain certifications and practical training in high-demand areas. Participant 8 reported that *“Ehlanzeni TVET has established strong partnerships with industry leaders, enabling students to gain certifications and training in high-demand areas. These collaborations help bridge the gap between theoretical knowledge and practical application by allowing students to work on real-world projects that integrate sustainability.”*

Participant 4 confirmed that: *“Partnering with the people or farmers who have expertise in different areas of agriculture. The major strategy that we have used is visiting the industry with the students, where we take students, for example, in agriculture, we take them to these farms where they are doing the modern types of farming.”* Participant 3 argued that the pace needs to be accelerated: *“...And I think that's where, as a college, we need to move with speed in establishing what I call public-private partnerships that are beneficial to both parties. So that at least the private sector will come in and fund these programs. So that is another significant challenge we are having there.”*

Such partnerships are essential for preparing students for the job market and promoting sustainable development, a point echoed by the literature. Majumdar (2009) emphasizes that industry partnerships are pivotal in embedding sustainability in TVET programmes, as they enable the direct application of green skills and innovation.

This aligns with recent findings by Moodley and Singh (2021), who argue that public-private partnerships in TVET are essential for overcoming funding challenges and keeping pace with industry developments. These partnerships ensure that students are equipped with relevant skills for the green economy while enabling the private sector to invest in future-ready talent.

4.2.3. Implementation of New Sustainable Programmes (Occupational Programmes)

One of the strategies for sustainability is the new introduction of occupational programs within the college, which include green skills.

Participant 1 reported that: *"Yeah. Currently, ma'am, we are looking into renewable energy. We have already started. We have trained about 30 of our female students in the college and five lecturers in renewable energy. The reason for this is because we are now responding to the power challenge that we have as a country."*

Participant 2 also agreed with the other participants: *"...And as we are introducing the programs, the occupational and the skills programs, they must also speak to the needs of our economy and the needs of our nations in five years from now, not only in terms of responding to what we currently need."*

The implementation of new sustainable programmes, particularly occupational programmes integrating green skills, has become a strategic priority for TVET colleges, including Ehlanzeni TVET. These programmes address critical environmental and socio-economic challenges, such as renewable energy and climate change. This initiative reflects the departmental document advocating for green skills in TVET institutions to promote sustainable development (Department of Higher Education and Training, 2014).

Pramjeeth et al. (2023) emphasize the importance of green skills in preparing for a sustainable economy. Participant 2 added that these programs must anticipate future economic needs, a view supported by Moodley and Singh (2021), who argue that aligning occupational programs with future green job markets is essential for the relevance and sustainability of TVET institutions.

The "Greening TVET Colleges Initiative" by the Department of Higher Education and Training (2014) serves as a foundational document supporting the integration of green skills into South African TVET curricula. This document emphasizes the necessity of sustainable occupational programs, which include training in renewable energy, waste management, and climate-smart agriculture, to address current environmental challenges while meeting socio-economic demands.

In alignment with this initiative, Pramjeeth et al. (2023) emphasize that green skills are crucial for preparing students for a sustainable economy. Moodley and Singh (2021) further support this by advocating for TVET institutions to align occupational programs with emerging green job markets, ensuring the programs' relevance in an evolving economic landscape. Participant 2 from the study echoes these views, suggesting that such programs should proactively address future economic needs, positioning TVET institutions to contribute meaningfully to sustainable development.

4.2.4. Future Strategies for Aligning with Sustainable Development in the TVET

In reviewing the department documents, greening institutional culture involves embedding sustainability principles into the ethos and operations of TVET colleges. This includes fostering a culture of environmental responsibility among staff, students, and administration, and promoting sustainable practices as core values of the institution (Department of Higher Education and Training, 2014). According to department documents, DHET emphasizes the need for green TVET: "It is not sufficient just to support a change of mindset – both with the

instructors and the students – TVET institutions have to become green, too” (Department of Higher Education and Training, 2014). The Ehlanzeni leaders reported their future plans on sustainability.

Participant 8 reported: *“We are exploring ways to further align the curriculum with community-based sustainability projects, like recycling and waste management, ensuring that education extends beyond the classroom and has a tangible impact on local environmental and economic sustainability. This strategy includes continually updating the 4IR centre to integrate sustainability-focused innovations.”* Participant 6, in support of others, reported that: *“...We are also thinking of moving into drone technology. We have our agriculture. We have a farm that was donated to us by one of our partners, as I mentioned. Partnership is also helping us. So, with that, we are thinking that instead of having students trained in the traditional way, they will understand technology and be able to respond to issues like solar energy, drones, saving electricity, and saving energy.”*

5. DISCUSSION OF FINDINGS

The DHET Greening TVET Colleges Initiative in South Africa Guide for Practitioners serves as the foundational document on sustainable development for the TVET sector, promoting a holistic approach through green committees, environmental policies, and stakeholder engagement. However, its limited scope highlights the need for expanded resources and further research (Department of Higher Education and Training, 2014). Leaders at Ehlanzeni TVET College view Quality Education for Sustainable Development (QESD) as inclusive and aligned with Sustainable Development Goal 4, aiming for equitable educational access. Participants' insights echo Ebersold and Schmitt (2021)'s perspective on QESD's role in fostering social inclusion and Tikly (2023)'s call for curriculum alignment with national goals. Key challenges in integrating sustainability include outdated curricula, limited infrastructure, and alignment with market needs, reflecting issues highlighted by Mutebi and Kiplagat (2022) and Shava et al. (2020). Funding limitations further constrain progress (Ogur, 2023), with insufficient infrastructure also impeding program updates (McGrath, 2018).

To address these challenges, educational leaders advocate for continuous professional development to enhance teaching methodologies and adopt green skills (Mokhele et al., 2022). Industry partnerships and community engagement are viewed as critical for aligning TVET curricula with market demands and sustainability goals (Majumdar, 2009; Moodley & Singh, 2021). Additionally, Ehlanzeni TVET College has introduced sustainable occupational programs focusing on renewable energy, supporting the DHET's emphasis on incorporating green skills into the curriculum (Department of Higher Education and Training, 2014). Leaders are also exploring future strategies, such as implementing solar power and community sustainability projects, to create a "green TVET" culture and embed sustainability into the institutional ethos (Department of Higher Education and Training, 2014).

6. CONCLUSION

The study at Ehlanzeni TVET College reveals that educational leaders perceive Quality Education for Sustainable Development (QESD) as integral to achieving inclusive, equitable, and holistic learning aligned with Sustainable Development Goal 4 (SDG 4). However, barriers such as outdated curricula and limited funding hinder the effective integration of sustainability into TVET programs. Moreover, McGrath et al. (2020) argue that the major challenge is the current theoretical approaches to Vocational Education and Training, which are inadequate to meet challenges faced in the African context. They further mention that literature on skills for sustainable development explores how Vocational Education and Training can address environmental concerns, promote green skills and just transitions, and highlights the need for participatory and inclusive knowledge development. These findings emphasize the need for TVET institutions to adapt their educational frameworks to address both local and global sustainability goals, ensuring they equip students with skills relevant to evolving workforce demands and societal needs.

Sequel to the findings of this study, the following recommendations are made.

- There is a need for continuous curriculum assessment for clarity, alignment of programs with sustainable development, and responsiveness to current economic and social shifts.

- Also, there is a need for fostering strategic partnerships to address funding challenges and enhance institutional capacity for implementing sustainable and sustainability development-related programs.
- Incorporating community insights into curriculum development is recommended, as this can improve the cultural relevance and social impact of TVET education.
- The need to embrace the value of a holistic, inclusive approach to educational research, focusing not only on systemic challenges but also on practical solutions that bridge gaps in policy, practice, and community needs, is paramount and recommended.

Funding: This study received no specific financial support.

Institutional Review Board Statement: This study was approved by the Institutional Review Board of the University of Johannesburg, South Africa, under protocol number [IRB No. SEM 1-2024-108], dated May 14, 2024. Informed verbal consent was obtained from all participants, and all data were anonymized to protect participant confidentiality.

Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.

Competing Interests: The authors declare that they have no competing interests.

Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

REFERENCES

- Ayub, N., Khan, A., Zafar, M., & Hussain, S. (2022). Implementation of education for sustainable development in higher education institutions: A case study. *Journal of Cleaner Production*, 300, 1-10.
- Berchin, I. I., de Aguiar Dutra, A. R., & Guerra, J. B. S. O. D. A. (2021). How do higher education institutions promote sustainable development? A literature review. *Sustainable Development*, 29(6), 1204-1222. <https://doi.org/10.1002/sd.2219>
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). United States: SAGE Publications.
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). United States: SAGE Publications.
- Department of Higher Education and Training. (2014). *Greening TVET colleges initiative in South Africa: Guide for practitioners*. South Africa: Department of Higher Education and Training.
- Ebersold, S., & Schmitt, M. J. (2021). Promoting equity in education: A comparative analysis of inclusive education policies in European countries. *European Journal of Special Needs Education*, 36(4), 567-586.
- Flick, U. (2022). *An introduction to qualitative research* (7th ed.). United States: SAGE Publications.
- González García, E., Colomo Magaña, E., & Cívico Ariza, A. (2020). Quality education as a Sustainable Development Goal in the context of 2030 agenda: Bibliometric approach. *Sustainability*, 12(15), 5884. <https://doi.org/10.3390/su12155884>
- Majumdar, S. (2009). *Major challenges in integrating sustainable development in TVET*. International Conference: Reorienting TVET Policy Towards Education for Sustainable Development, Berlin, Germany.
- McGrath, S. (2018). *Greening technical and vocational education and training for sustainable development*. In S. McGrath, M. Mulder, J. Papier, & R. Suart (Eds.), *Handbook of vocational education and training: Developments in the changing world of work*. Switzerland: Springer International Publishing.
- McGrath, S., Ramsarup, P., Zeelen, J., Wedekind, V., Allais, S., Lotz-Sisitka, H., . . . Russon, J.-A. (2020). Vocational education and training for African development: A literature review. *Journal of Vocational Education & Training*, 72(4), 465-487. <https://doi.org/10.1080/13636820.2019.1679969>
- Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation*. United States: Jossey-Bass.

- Mokhele, M., Kritzinger, A., & Mosito, M. (2022). Professional development in TVET: Addressing the skills gap for sustainable education. *South African Journal of Education*, 42(1), 1-12.
- Moodley, T., & Singh, R. (2021). Enhancing public-private partnerships in TVET for sustainable development in South Africa. *Journal of Vocational Education and Training*, 74(3), 303-317.
- Mutebi, R., & Kiplagat, H. (2022). TVET response to global challenges of sustainable development. *African Journal of Education, Science and Technology*, 7(1), 447-456.
- Nkambule, B. I., & Ngubane, S. A. (2023). Eradicating a culture of public mistrust in TVET college education in South Africa: A manifesto for the sector's sustainability ahead of 4IR. *Research in Social Sciences and Technology*, 8(4), 301-329. <https://doi.org/10.46303/ressat.2023.44>
- Ogur, E. O. (2023). TVET, economy and sustainable development. *International Journal of Vocational and Technical Education*, 15(2), 12-17. <https://doi.org/10.5897/IJVTE2022.0315>
- Pramjeeth, S., Nupen, D. M., & Jagernath, J. (2023). Challenges impacting higher education leaders in achieving the Sustainable Development Goal of quality education in South Africa. *African Journal of Inter/Multidisciplinary Studies*, 5(1), 1-13. <https://doi.org/10.51415/ajims.v5i1.1178>
- Qablan, A., Alblooshi, K. M., & Alkaabi, F. A. (2023). Education for sustainable development (ESD) and school leadership. In Restructuring leadership for school improvement and reform. In (pp. 378-398). IGI Global: United States.
- Qiong, J. Y., Kamis, A., Mei, S. Y., & Rus, R. B. C. (2022). A review on sustainable development of technical and vocational education and training among the students from China. *International Journal of Academic Research in Progressive Education and Development*, 11(3), 58-65. <https://doi.org/10.6007/IJARPED/v11-i3/14258>
- Savin-Baden, M., & Howell Major, C. (2013). *Qualitative research: The essential guide to theory and practice* (1st ed.). UK: Routledge.
- Shava, G. N. (2020). Quality education for sustainable development in Zimbabwean higher education: towards UNDP 2030 SDG. In The education systems of Africa. In (pp. 1-26). Cham: Springer International Publishing.
- Shava, G. N., Hleza, S., Mathonsi, E., Shonhiwa, S., & Hlabangana, N. (2021). Towards achieving innovation through mainstreaming Sustainable Development Goal 4 on quality higher education: The Southern African perspective. *International Journal of Research and Innovation in Social Science*, 5(12), 188-201.
- Shava, G. N., Mkwelie, N., Ndlovu, M. J., & Zulu, E. (2023). Higher education institutions' sustainable development towards agenda 2030: A global goals in policy and curriculum. *International Journal of Research and Innovation in Social Science*, 7(4), 1320-1336. <https://doi.org/10.47772/IJRISS.2023.7510>
- Shava, S., Makokotlela, M. V., & Hebe, H. (2020). Role of SDGs in reconceptualising the education for sustainable development curriculum in higher education in South Africa. In G. Nhamo, G. Odularu, & V. Mjimba (Eds.), *Scaling up SDGs Implementation*. In (pp. 143-154). Switzerland: Springer.
- Shulla, K., Filho, W. L., Lardjane, S., Sommer, J. H., & Borgemeister, C. (2020). Sustainable development education in the context of the 2030 Agenda for sustainable development. *International Journal of Sustainable Development & World Ecology*, 27(5), 458-468. <https://doi.org/10.1080/13504509.2020.1721378>
- Siebrits, A., & Van De Heyde, V. (2019). Towards the Sustainable Development Goals in Africa: the African space-education ecosystem for sustainability and the role of educational technologies. In *Embedding Space in African Society: The United Nations Sustainable Development Goals 2030 Supported by Space Applications*. In (pp. 127-180). Cham: Springer International Publishing.
- Tenny, S., Brannan, J. M., & Brannan, G. D. (2017). *Qualitative study*. In *StatPearls*. United States: StatPearls Publishing.

- Tikly, L. (2023). Education for sustainable development: A framework for TVET in Africa. *Journal of Vocational Education & Training*, 75(2), 109-126.
- UNESCO. (2019). *UNESCO strategy for TVET (2016-2021): UNESCO technical and vocational education and training strategy*. France: UNESCO.
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United States: United Nations.
- Vilmala, B. K., Karniawati, I., Suhandi, A., Permanasari, A., & Khumalo, M. (2022). A literature review of education for sustainable development (ESD) in science learning: What, why, and how. *Journal of Natural Science and Integration*, 5(1), 35-44. <https://doi.org/10.24014/jnsi.v5i1.15342>
- Yin, R. K. (2020). *Case study research and applications: Design and methods* (6th ed.). United States: SAGE Publications.
- Zickafoose, A., Ilesanmi, O., Diaz-Manrique, M., Adeyemi, A. E., Walumbe, B., Strong, R., . . . Dooley, K. (2024). Barriers and challenges affecting quality education (Sustainable Development Goal# 4) in Sub-Saharan Africa by 2030. *Sustainability*, 16(7), 2657. <https://doi.org/10.3390/su16072657>

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