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The Journal of Vocational, Adult and Continuing Education and Training

The Journal of Vocational, Adult and Continuing Education and Training (JOVACET) recognises the need for critical engagement through studies in technical and vocational education and training (TVET) and adult and continuing education and training, and for encouraging critical scrutiny of this expansive knowledge area on the African continent.

The voices and experiences of practitioners, reflecting on all aspects of teaching and learning within vocational education and adult education settings, should be heard through the publication of empirical and robust research. While the journal wishes to take forward academic scholarship, it also seeks to strengthen opportunities for reflective practice that makes a scholarly contribution to the field. New knowledge emerging out of complex developmental contexts has significant value and needs to be showcased beyond existing geographical and political boundaries. The journal is therefore committed to also supporting the development of emerging researchers by providing them with a space to present and defend their research amongst a network of global scholars. Within the field of vocational and continuing education there is substantive 'grey literature' that remains in project report form. The journal is potentially a vehicle for the translation of this important work into an academic contribution to a wider community of practice, thereby enhancing its value.

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EDITORIAL

Joy Papier

Editor-in-Chief

Welcome readers to the 10th issue of *JOVACET* published during the journal's eight years of its existence. Over this period, we have seen submissions grow substantially, readership has increased nationally and we continue to extend our footprint internationally. *JOVACET* consistently strives to publish articles of high quality, and for this we have to appreciate our pool of committed reviewers. In our pursuit of quality output, a high number of submissions unfortunately do not make the cut, but every effort is made to encourage authors to resubmit successfully. The topic of quality and what constitutes it is much debated and applies equally to many aspects of vocational and continuing education, inter alia, institutional issues, teaching and learning, policy implementation, curriculum, student performance and research.

In this issue of *JOVACET*, the broad theme of inclusivity can be discerned in studies undertaken in different vocational learning contexts where students experience various forms of marginalisation or 'othering' – whether as adult learners in community colleges, students seeking an alternative route into higher education, as hearing-impaired learners in vocational schools or as students trying to live authentic, successful lives.

We begin with three articles that address student performance. Powell, Muronda and Tini (2025) adopt a realist capability approach to 'reframe' TVET student performance in terms of how students are able to convert educational endeavours into achievements that are meaningful for them. Using conceptual argument and the results of their empirical data, they arrive at a four-dimensional framework encapsulating 'institutional endowments, student endowments, the broader skills development system and socio-economic situatedness'. The data pointing to these four elements of the framework highlight issues that have long been manifested in the interrelated domains that shape vocational students' ability to succeed. There are findings of inadequate institutional student support, a college language of learning and teaching (LOLT) in English without systematised accommodation for the 90% of students who have one of the other official African languages as first language, and socio-economic vulnerabilities in the face of an inefficient national student funding scheme,

all of which require students to draw deeply on self-motivation and resilience. This study confirms the inter-relatedness of 'the relational, institutional and social ecosystems that shape (students') real opportunities to thrive' and the stressors that ultimately cause many TVET students to drop out of the system.

Nefdt, Dippenaar and Engel-Hills (2025) examine further how TVET students cope with stressful factors in their contexts by applying the Lazarus theory of stress. In terms of their study, students' social ecosystems reveal the financial constraints, daily domestic pressures and academic challenges that result in significant stress. While some students draw on individual reserves and coping mechanisms, others need the targeted support of strong support systems if they are to improve their well-being and enhance their success.

The third article on the theme of student performance and success is that of Ngoveni, Motseki and Machaba (2025) who through trial-and-error analysis utilise a 'design-based research approach' to enhance students' comprehension of financial mathematics concepts. The researchers adapted financial problems familiar to students' own situated environments and investigated how entry-level students interpreted and tried to solve them. By analysing the errors that students made, the study used 'iterative cycles of design, implementation and analysis' to continuously refine the instructional strategies for this subject. Once initial student errors were identified after application among the first group of students, the second iteration targeted specific misunderstandings and attempted to make abstract concepts even more concrete. A subsequent, similar group of entry-level students showed greater success in understanding the key concepts, which was reflected in their higher scores, confirming that contextualised learning experiences and continuous feedback can lead to improved performance outcomes.

Two articles in our second theme deal with marginalised students who are often invisibilised in vocational settings: the first concerns the experiences of violence and 'othering' of students perceived to be 'different' and, the second, the attempts at achieving inclusivity for hearing-impaired students. Siwela (2025) undertook a brave exposé of the experiences of violence against 'black lesbian students at a TVET college'. This qualitative study combined verbal accounts and visual narratives to build a picture of the harrowing violence that students often suffer at the hands of homophobic and prejudiced peers. Respondents who were willing to speak out revealed 'sexual, emotional, physical and verbal violence' during the course of their studies. While some higher education spaces may be more welcoming and open to diverse gender identities and sexual orientations, the author points to TVET spaces in particular where authorities should employ intentional and consistent interventions to sensitise students to diversity and support the emotional well-being of *all* students.

Muwaniki and Matara (2025) shine light on hearing-impaired students in vocational education in Zimbabwe, while integrating an important, relatively new feature of our education and training landscape, that of social media and the affordances of artificial intelligence (AI). AI promises to fundamentally change every aspect of our lives, including posing new

and difficult challenges for all levels of education and training. Learning institutions and educators are currently grappling with what the applications of AI mean for questions of, amongst others, ethics, authenticity and independent learning. But the benefits of digital and AI tools for learning and participation cannot be ignored, specifically for hearing-impaired learners, which is what the writers of this article explored. Data gathered from purposively selected students showed that social media and AI tools significantly expanded learning for a potentially marginalised group of students by offering them inclusive opportunities despite persistent barriers that hinder the optimal utilisation of such future-focused technologies in their institutions.

In a second article on the topic of AI, its potential for offering expansive learning to another group of marginalised students – adults seeking access to higher education via recognition of prior learning (RPL) – is highlighted. Here, Rambharose (2025) looks at the use of AI applications in RPL assessment, facilitating processes that have been lamented as being cumbersome and resource-intensive through automation and more accurate assessments. In a systematic literature review and reflective analysis, the author juxtaposes the roles of AI-driven tools with adult learning principles and shows the synergies between them. But a cautionary note is sounded in that, despite the more efficient and transparent AI-driven RPL processes, ethical safeguards and ongoing critical reflection need to be put in place by responsible practitioners. The potential of AI for inclusive and expanded learning opportunities is recognised in the literature, of which the article offers a helpful and analytical summation.

The fourth theme is that of vocational skills development in the form of an article dealing with workplace learning and skills ecosystems; and another that discusses work placements for vocational adult educators-in-training. South African researchers in the field of education and labour have generally acknowledged the need for vocational students to obtain authentic learning and experience in the workplace and have shown that the number of students seeking such opportunities perennially exceeds the number of placements that employers can offer.

Ramsarup, Mlauzi, De Clercq and Robbins (2025) argue that in light of 'the reality of African labour markets, a more place-based approach to framing skills development in building local economies is needed'. They adopt a framework that places the onus on a 'systemic collective' to identify skills needs in local contexts rather than placing this burden on individuals. The conceptual framing of skills ecosystems is used to explore the skills needs in installation repair maintenance (IRM) hubs in four South African townships, examining the stakeholders and policies that affect the skills environment in these contexts. Findings emphasise that the various layers of skills development in these ecosystems require comprehensive approaches to strengthen skills development partnerships among institutions and potential medium, small and micro-enterprises (MSMEs), and, inter alia, 'aligning training programmes with MSMEs' needs, improving access to capital and infrastructure and market visibility'.

In a second article on the theme of learning and work, Seleke, Teis and Matiso (2025) conduct a comparative evaluation of teaching practice placements for adult education students at community colleges in rural and urban areas. Set in the Eastern Cape Province of South Africa, the research focused on placement sites for the mandatory work-integrated-learning (WIL) component of a diploma programme in adult and community education and training. As with conventional teacher training programmes, the adult educator qualification requires a prescribed number of hours of workplace practice in an authentic adult education context, but this largely under-funded sector of education offers limited opportunities for such placement. Moreover, the inequities between urban and rural adult education settings are often starkly visible. Unsurprisingly the empirical evidence revealed such disparities: the urban institutions offering significantly enhanced workplace experiences for potential adult educators, compared with rural institutions that presented constraints impeding good-quality teaching experiences. What needs to be done would appear to be quite clear from the research – but it remains to be seen how and when this uneven provision will be addressed.

We close our 2025 issue with an article on TVET college governance and management, a topic that cuts across and possibly impacts on all of the matters of concern in this issue of the journal. Dieltiens and Engelbrecht (2025) report on a research project that investigated the form and function of college councils in South African public TVET colleges. College councils operate in terms of national policy on college governance and comprise internal and external college stakeholders, including ministerial appointments. An interesting question posed by the study was whether this form of governance (the college council) matches its functions in terms of oversight and accountability responsibilities. A fairly large survey and a number of interviews that were held with relevant role players led to the conclusion that 'college councils add another layer of accountability to TVET colleges without necessarily contributing to their institutional development'. According to the authors, this conclusion was derived from findings which revealed weighty demands made of college councils which do not have the 'structure, operational procedures and capacity … capable of carrying the weight of these responsibilities'.

Given these brief glimpses into the contents of our 2025 *JOVACET*, we trust that your intellectual curiosity/interest has been piqued and that you will be tempted to delve deeper into the articles or even expand on the topic by submitting your own research into it. We look forward to original submissions based on robust justification that stimulate and invigorate our readers.

Thanks again to our editorial board and committee members, and our peer reviewers who continue to make *JOVACET* a valuable addition to the vocational and adult education and training landscape.

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Reframing student performance in South African technical and vocational education and training colleges: A realist capability approach

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ABSTRACT

This article examines the factors influencing student performance in South Africa's vocational education and training colleges, reframing achievement not as an individual outcome but as a function of students' capabilities to convert educational opportunities into meaningful success. Grounded in the realist capability approach, the study developed a four-dimensional framework. These dimensions emerged both from conceptual reasoning and through principal component analysis of survey data supported by interviews with college students and staff. Findings show that performance is shaped by factors such as student support and English-only instruction, alongside students' own motivation and resilience, poverty, insecure housing and gendered vulnerability. This study offers a multidimensional and justice-orientated perspective on student success. It calls for a systemic shift from evaluating students in isolation to recognising the relational, institutional and social ecosystems that shape their real opportunities to thrive.

KEYWORDS

Vocational education and training; student performance; student success; realist capability approach; principal component analysis (PCA); capability deprivation

Introduction

South Africa's technical and vocational education and training (TVET) colleges occupy a critical space in the post-school education and training (PSET) system. Tasked with the dual mandate of addressing youth unemployment and providing skills for economic development, the sector faces persistent challenges in student retention, progression and graduation. Despite significant public investment and ambitious policy goals, including those set by the National Development Plan (NDP), student success rates at TVET colleges remain unacceptably low. A 2024 Department of Higher Education and Training (DHET) report revealed that only 10.9%, 13.2% and 10.8% of National Certificate Vocational (NCV) students completed their programmes within the standard three-year period in the years 2019, 2020 and 2021, respectively (Khuluvhe, Netshifhefhe & Gwantshu, 2024).

While these statistics signal systemic inefficiencies, they also invite deeper questions about how student performance is conceptualised, measured and supported in the TVET context. Mainstream approaches – rooted in psychological and managerial traditions – tend to isolate student attributes or institutional processes as the key to success. However, such approaches risk obscuring the broader structural, social and institutional contexts in which TVET students navigate their educational journeys. This article addresses that gap by advancing a framework informed by the realist capability approach (Powell & McGrath, 2019), which draws on the philosophical foundations of critical realism and the capability approach (Sen, 1990; Nussbaum, 2000) to offer a more contextually grounded understanding of student performance.

It is based on a study undertaken as part of the DHET five-year TVET Research Programme, launched in 2019, and draws its empirical findings from the related report titled *Factors affecting student performance at TVET colleges* (Powell, Muronda & Tini, 2024). It is further based on a mixed-methods investigation of the factors affecting student academic achievement at TVET colleges. Drawing on both quantitative and qualitative data, we developed a four-dimensional construct to conceptualise student performance, integrating institutional 'endowments' (DeJaeghere & Baxter, 2014:69), student endowments, the broader skills development system and socio-economic situatedness. These dimensions are not presented as fixed variables but as 'relational capabilities' (DeJaeghere, 2020:18), that is, the conditions that enable students to pursue and achieve the lives they have reason to value.

What is conceptually and methodologically significant is that the same four-dimensional matrix emerged independently from both the theoretical framework and the empirical data. The study thus not only proposes a conceptual lens through which to understand student performance, but also demonstrates its empirical validity through data-driven analysis. These four dimensions – institutional endowments, student endowments, the broader skills development system and socio-economic situatedness – are presented as interrelated domains that shape students' ability to succeed. In doing so, this article offers both a diagnostic and a conceptual contribution. It identifies the principal components shaping student performance while also reimagining what 'success' might mean in the context of students' lived realities.

Ultimately, it calls for a more just and inclusive TVET system – one that recognises students not as deficient, but as capable agents navigating uneven terrain.

The article begins in the next section by outlining three dominant approaches to student performance – psychological, managerial and critical – and positions the realist capability approach as a framework that synthesises and extends them. Thereafter, the methodology section details the study's mixed-methods design, including the principal component analysis and qualitative interviews. This is followed by the findings that are presented using the four-dimensional construct, with each dimension explored as a site of capability expansion or constraint. This is followed by a discussion that reflects on the implications of the findings for educational justice, policy design and institutional practice. The article concludes by reaffirming the value of a capabilities perspective in reimagining student success in vocational education and training.

Conceptual framework: Realist capability approach

The literature on student performance in vocational education and training systems has traditionally focused on throughput, pass rates, retention and graduation. Dominant approaches, rooted in psychological and managerial paradigms, emphasise either individual attributes such as motivation, self-efficacy or time management or institutional efficiency, measured through inputs, outputs and resource optimisation as key determinants of success (Powell & McGrath, 2014).

Educational psychology has generated important insights into the conditions that enable academic achievement. In this tradition, the learner is the unit of analysis. For instance, Nye et al. (2012) explore the relationship between interest and vocational performance, while Tarnongu (2016) and others (cf. Lens and Vansteenkiste, 2008) examine the intrinsic motivation and academic achievement. Winne and Nesbit (2010) distinguish between two key domains: the structural features of instruction that influence learning, and learners' active engagement through metacognition and self-regulation. While sociocultural strands within educational psychology, such as those informed by Vygotsky (Vygotsky & Cole, 1978), have long foregrounded the role of context, social interaction and cultural tools in shaping learning, such approaches are underutilised in understanding TVET performance and have largely been applied to vocational pedagogy, teacher education and learning mediation (Moll & Naiker, 2024; Lenyai, 2019; Ngoveni & Machaba, 2024).

The management tradition, by contrast, focuses on aligning inputs and processes to maximise institutional outputs, often using efficiency and effectiveness indicators (Bess, Johnstone & Dee, 2023; Powell & McGrath, 2019). Badenhorst and Radile (2018), for example, argue that South Africa's TVET system suffers from fragmentation and weak leadership, issues that a narrow focus on individual performance cannot address. They call instead for systemic reforms, including stronger collaboration and distributed leadership, to enhance performance across TVET colleges. This was further illustrated by Hagos and Van Kemenade (2013) who

opined that, by adopting total quality management (TQM) principles, TVET reforms in developing countries can focus on achieving specific learning outcomes, leading to improved student success. While valuable, these approaches tend to frame achievement within narrow technicist or behaviourist logics, neglecting the broader socio-economic and institutional contexts in which students are embedded.

Multi-scalar approaches attempt to bridge this gap by recognising that individual and institutional performance are interconnected. Zepke and Leach (2005) categorise these as efforts to better integrate the learner into the institutional context. Bronfenbrenner's (1979) bioecological model, often cited here, identifies five interrelated systems, micro, meso, exo, macro and chrono, that shape learners' experiences and outcomes.

Critical traditions foreground structural constraints and power relations. Grounded in the political economy of skills (Hall & Soskice, 2001; Allais, 2012), this perspective emphasises how institutional and structural arrangements both shape, and are shaped by, the vocational education system. Allais (2012) explored South Africa's experiences with skills development, highlighting the failure of policy interventions to increase the number of skilled workers despite numerous initiatives which include TVET programmes. These traditions highlight the role of poverty, unequal access to resources and the enduring academic–vocational divide in reproducing social stratification. South African scholarship is particularly strong here, with contributions from Webster and Leger (1992), Chisholm (1992), Vally and Motala (2014), Wedekind (2013) and McGrath et al. (2020). This body of work challenges human capital assumptions underpinning vocational education (Vally & Motala, 2014), exposes the limitations of supply–demand models (Allais et al., 2021) and advocates for human development orientations (Powell, 2021). While essential, the critical tradition can sometimes underplay the agency and aspirations of students themselves.

The realist capability approach

To navigate this tension, this article draws on the realist capability approach (Powell & McGrath, 2019), which combines elements of critical realism with Sen's and Nussbaum's capability approach to offer a justice-oriented, context-sensitive framework for understanding educational and social transformation. It foregrounds human agency, well-being and the real freedoms individuals have to live the lives they value, rather than focusing narrowly on outcomes such as economic productivity, student achievement or access to services. Drawing on Sen and Nussbaum, the capability approach defines development in terms of expanding people's capabilities – the genuine opportunities to achieve valued functionings (beings and doings). However, having resources does not automatically result in capabilities. The conversion of resources into capabilities is shaped by institutional, social and environmental conversion factors, such as curriculum relevance, recognition and support systems. Critical realism complements this by offering a deep ontology that helps researchers uncover the often-hidden structures and mechanisms shaping outcomes. It asks not only what works, but also for whom, in what contexts, and why (Pawson & Tilley, 1997).

Following DeJaeghere and Baxter (2014), we distinguish between *endowments* (resources or assets available to students and institutions), *capabilities* (real opportunities to achieve valued outcomes) and '*functionings*' (Sen, 1990:43) (actual achievements). Access to education does not guarantee capabilities; students must be able to convert these into meaningful outcomes (Walker & Unterhalter, 2007). Here, '*conversion factors*' (Robeyns, 2005:99), such as language, instructional quality, financial stability and social norms, are central (Robeyns, 2005).

The realist component of the framework draws attention to underlying causal mechanisms and patterned social structures that shape or constrain agency. These include institutional norms, policy environments, socio-economic backgrounds and everyday practices that are often invisible in outcome metrics but critical to explaining persistent disparities. Student achievements are shaped by a combination of these elements. For instance, conversion factors such as teaching quality or access to learning materials can enable or inhibit capability development. Institutional endowments, such as infrastructure and support services, are vital, as are student endowments like motivation, academic preparation and financial security. Social and institutional contexts are equally significant. Factors such as household income, rural–urban divides, parental education and labour market dynamics intersect with student and institutional capacities in complex ways.

The realist capability approach emphasises the dynamic interplay between structure and agency, recognising that individuals act within, and are shaped by, broader social, institutional and historical contexts. Within the realist capability approach, agency is central to human development, as it highlights not only the importance of having choices, but also the ability to act on them meaningfully. While individuals are seen as capable of shaping their own lives, their agency is exercised within structural contexts that can either enable or constrain their choices. This dual recognition, of people as active agents and of the social conditions that affect their actions, allows for a nuanced understanding of how development and educational outcomes are achieved. Supporting agency, therefore, requires not just access to resources, but also the removal of structural barriers and the creation of enabling conditions that expand real opportunities for action. In this way, researchers are able to engage with questions of justice, inequality and transformation by asking not only what programmes or policies achieve, but also how they impact individuals' capabilities, and whether they support genuine empowerment and well-being.

Operationalising the realist capability approach allowed us to develop a four-dimensional construct capturing the key domains influencing student performance:

1. **Institutional endowments:** Culture, capacity and material conditions of the college (e.g. infrastructure, lecturer quality, language policy).
1. **Student endowments:** Personal and social resources (e.g. financial means, psychological readiness, academic background).
1. **The broader skills development system:** Policy, funding structures and labour market alignment.
1. **Situatedness:** Students' embeddedness in social realities including family, community and structural inequality.

This framework (see Table 1) organises the principal components into an integrated matrix, allowing analysis not only of what resources exist, but also of how they are accessed and converted into achievement. It challenges deficit narratives that cast vocational students as 'the poor, the desperate, and the academically weak' (Powell & McGrath, 2019:22). Instead, by illuminating the systemic and relational factors shaping performance, it offers a more generative view of student potential that acknowledges that TVET students' achievements are shaped by a combination of these elements.

By applying this framework, we aim not only to identify the factors influencing performance, but also to reconceptualise student success as a function of capability expansion. The following section outlines the study's design and what it reveals about the lived realities of students in South African vocational colleges.

TABLE 1: Matrix of factors affecting student performance

	INTERNAL FACTORS	**EXTERNAL FACTORS**
College-based factors	Institutional endowments	Broader skills development system
Student-based factors	Student endowments	The situatedness of the students in their homes, communities and broader society

(modified from DeJaeghere & Baxter, 2014)

Methodology

This study employed a mixed-methods design to investigate the complex interplay of factors affecting student performance in South African TVET colleges. As part of DHET's five-year TVET Research Programme, the research was guided by a commitment to understanding student achievement not simply as an outcome to be measured but as a relational phenomenon shaped by institutional, systemic and socio-economic dynamics.

The research design was sequential and explanatory. It began with the development and administration of a survey instrument comprising 108 variables related to institutional support, student background, motivation, pedagogical quality and social conditions. The quantitative survey administered online to the 50 TVET colleges in the country gathered data from over 1,042 students, which was subjected to principal component analysis (PCA). This was followed by in-depth qualitative interviews with 27 TVET college principals and managers, 36 lecturing staff and 77 TVET college students. Qualitative data was collected through semi-structured interviews and focus-group discussions with students and academic staff. We purposively drew our sample from five provinces, namely the Eastern Cape, KwaZulu-Natal, the Western Cape, Gauteng and the Free State.

Ethical clearance was obtained through the relevant institutional review board. All participants provided informed consent, and care was taken to ensure anonymity and confidentiality. The research process was guided by an ethic of respect for student voice and experience, with particular attention to how structural inequalities shape their engagement with the TVET system.

The qualitative phase was followed by analysis. Quantitative analysis of the survey was conducted using PCA, a dimension-reduction, quantitative analytical technique that distilled and ranked the factors that affect student performance at TVET colleges from the survey. PCA reduced the number of variables in the analysis whilst retaining as much of the information contained in the original dataset as possible. As detailed in the results, the 108 measured variables were reduced to 4 principal components/factors/dimensions.

Thematic analysis was used to identify patterns in the narratives. This iterative, mixed-methods approach allowed for deeper engagement with the data and supported a capabilities-informed reinterpretation of student performance, moving beyond surface indicators to consider students' real freedoms and constraints.

In this study, the PCA was utilised in three ways: (i) first, to discover and identify the linear combinations of the measured variables (principal components) that contain the most variation (eigenvalues) in the dataset; (ii) second, to discover if the measured (manifest) variables, when organised in a particular way, reflect another new underlying variable (principal component); and (iii) third, to confirm a belief held a priori, based on theory and literature as discussed above, that student performance is a multidimensional construct and could be analysed in a four-dimensional construct.

Findings: A realist capability-informed perspective on student performance

The principal component analysis (PCA) revealed four key dimensions influencing student performance: institutional endowments, student endowments, the broader skills development system and socio-economic situatedness. Together, these components accounted for 56% of the overall variance in the dataset and reinforced the conceptual framework guiding the study. They also structured the analysis of qualitative interview data collected from students, lecturers and college leaders.

The interview findings aligned closely with categories identified in the literature, confirming the relevance of this four-dimensional construct for understanding student performance in vocational education and training colleges. Rather than treating these dimensions as fixed variables, the framework conceptualises them as dynamic enablers of, or constraints on, students' capability expansion: their real opportunities to pursue and achieve educational success and valued life outcomes.

Table 2 presents the four principal components and their respective subfactors, drawn from 108 survey variables. Each factor is shown with its eigenvalue (indicating variance explained)

and key contributing variables with corresponding component loadings. Eigenvalues show how much each principal component contributes to explaining the data's variation. A larger eigenvalue means the component is more important, capturing a bigger chunk of the data's differences. A smaller eigenvalue means the component is less important, explaining only a small part of the variation. Loadings closer to ±1 indicate a stronger correlation between the variable and its associated principal component.

Each dimension reflects a potential site of transformation, shaped by the interplay between resources (endowments), conversion factors and the functionings students are able to realise. This framework thus offers a richer and more relational understanding of how educational opportunity is experienced and navigated.

TABLE 2: Matrix layout of factors affecting student performance as principal components

	INTERNAL FACTORS	EXTERNAL FACTORS
College-based factors	Principal component 1 (PC1). Institutional endowments (13) • My TVET college has in place all the support services to assist students. [0.74] • The TVET college provides adequate administrative support. [0.719] • My TVET college is well managed. [0.691] • My TVET college has excellent coordination between theory and practical subjects. [0.686] • My TVET college environment highly motivates me as a student. [0.681]	Principal component 3 (PC3). Broader skills development system (4.5) • NSFAS is the biggest cause of student dropout at the college. [0.675] • NSFAS pushes girls into uncomfortable relationships with boyfriends who can help support them. [0.573] • NSFAS puts students and their families into debt. [0.552] • Many students drop out during the waiting period of the NSFAS allowance. [0.534] • NSFAS makes student life stressful. [0.528]
Student-based factors	Principal component 2 (PC2). Student endowments (5.2) • I selected the programme I am enrolled in, and I am happy that I'm here. [0.629] • I am not interested in the programme that I am enrolled in. [0.607] • I take my studies as a personal responsibility. [0.577] • Studying at the TVET college has increased the possibility of achieving my goals. [0.546] • I am in this course because all other courses were full. [–0.542]	Principal component 4 (PC4). Situatedness of the students in their homes, communities and broader society (2.8) • Is your family solely dependent on social grants? [–0.49] • My home has tap water. [0.42] • Have you repeated a level? [–0.42] • Give a rough estimate of your family's income combined for a month. [0.40] • I live in an informal dwelling. [–0.37]

In the sections that follow, we explore each quadrant of the matrix in turn, drawing on qualitative interviews to deepen the interpretation of the survey data. The matrix is structured with college-based factors (internal and external) represented across the top row, and student-based factors across the bottom. Vertically, the first column captures internal factors, and the second external ones. Each quadrant represents a distinct intersection:

- PC1: Internal + college-based – *institutional endowments*
- PC2: Internal + student-based – *student endowments*
- PC3: External + college-based – *broader skills development system*
- PC4: External + student-based – *socio-economic situatedness*

This matrix provides a capabilities-informed lens through which to examine how performance is shaped not only by resources, but also by the systems, structures and relationships that enable or constrain their conversion into success.

PC1: Institutional endowments: Enabling environments or missed potential

Institutional endowments emerged as the most significant component in the principal component analysis (PCA), comprising 13 variables and accounting for the largest share of variance in student performance. This dimension includes a range of internal, college-based factors – material and relational – that shape the conditions under which students learn. These include student support services, administrative systems, lecturer engagement, alignment between theory and practice, and the overall ethos of the college environment.

Survey responses reflected strong student emphasis on support systems. Statements such as *'My TVET college has all the support services to assist students'* (loading: 0.74) and *'My college is well managed'* (loading: 0.73) loaded highly. However, students described understaffed bursary offices and delayed NSFAS processing. This finding is supported by Viljoen (2020), who focused on students at two Western Cape colleges, and student support emerged as contributing to academic achievement.

Students noted that financial aid offices were understaffed and often lacked the necessary knowledge to manage NSFAS-related processes effectively. One participant remarked, *'In some institutions the financial aid committees do not sit and there is a lot of maladministration happening at the bursary offices.'* Another added, *'Thousands of applications are sitting at the college to be checked by a bursary officer who is not even equipped [to deal with them].'*

Students and staff also highlighted the value, but frequent inadequacy, of counselling services. *'We need those people called social workers because these people can help us with the challenges, [such as] being unable to manage our time, the stresses, our personal lives, and our education as well,'* said one student, affirming the link between psychosocial support and academic engagement.

Administrative responsiveness was another recurring theme. Delays in issuing academic results, errors in registration and poor communication were frequently cited as demoralising. These were not simply bureaucratic frustrations – they represented concrete interruptions in students' learning journeys and constrained their *capability for continuity*. The item *'The college provides adequate administrative support'* had a strong loading of 0.72, underscoring its importance.

Lecturer engagement was experienced unevenly. Some students praised their lecturers' commitment, while others critiqued absenteeism and poor subject knowledge. One student remarked, *'There are lecturers that you can see teaching is not their calling.'* Interviews confirmed that, when colleges fostered a sense of belonging, students felt more capable and determined. Conversely, lack of encouragement and institutional opacity left students disengaged.

The theory–practice balance which is so central to TVET's purpose – as it provides students with both a capability and a conversion factor (Forcher-Mayr & Mahlknecht, 2020) – was valued by students, who found this alignment empowering. One lecturer described vocational education as livelihood preparation: *'They want to follow a vocational side of things… starting their own business.'* Yet others flagged gaps. A lecturer shared: *'The college does not invest in information technology and engineering… our students end up just doing theory.'* This compromises students' ability to convert learning into practical capability. These statements illustrate how practical learning can serve both as a capability and a conversion factor.

From a capabilities perspective, these findings underscore the importance of relational and procedural factors, not just material resources, in shaping student outcomes. Institutional endowments do not translate automatically into educational success; their effectiveness depends on students' ability to access and *convert* them into functionings. This requires not only adequate provisioning, but also intentional design, inclusive practices and responsiveness to student diversity. Where colleges are well managed, empathetic and student-centred, they function as enabling spaces. Where they are disorganised, opaque or indifferent, they become sites of exclusion.

PC2: Student endowments: Aspirations, agency and motivation

Student endowments, referring to the personal, social and educational resources that students bring to their studies, emerged as the second-most influential component in the PCA (eigenvalue: 5.2). Variables loading onto this component included motivation, time management, self-responsibility, programme alignment and educational aspiration. While often treated as individual-level factors, the findings suggest these are deeply shaped by institutional systems and structural conditions.

The survey item *'I take my studies as a personal responsibility'* (loading: 0.58) scored highly. Interview data confirmed this, with many students demonstrating determination and goal-setting, even in hugely challenging circumstances. One student shared, *'Persevere even if*

things get tough…. Don't let anything get you down. Say to yourself, "Don't give up!"' Another student explained how personal aspiration was rooted in early experiences of informal apprenticeship: *'I am always helping my uncle, who is an electrician…. I said to myself, "Let me study electricity because I can do some of the things."'* These stories illustrate the presence of the *capacity to aspire* (Appadurai, 2004: 69) or capability to aspire (Powell, 2012:p. 9) rooted in lived realities and imagined futures.

However, students' aspirations were frequently constrained by programme placement practices. The item *'I selected the programme I am enrolled in, and I am happy that I'm here'* loaded at 0.63, yet interviews revealed this was often not the case. One student recalled, *'I was told motor mechanics … [was] full. Then the campus manager said there were afternoon classes, and that is how I got the place.'* A lecturer confirmed, *'Most of the time, the student applies for a programme and, when it's full, they take the next-available programme.'* This redirection compromises choice and weakens the alignment between student interest and programme content. The survey item *'I am not interested in the programme I am enrolled in'* also loaded highly (0.61), highlighting this disconnect.

At the same time, lecturers noted frustration with students' inconsistent engagement. One remarked, *'A student just goes outside [because] the phone is ringing in class.'* This tension reveals the gap between educator expectations and the socio-economic pressures students navigate daily, pressures that shape how responsibility is enacted.

Despite such challenges, students frequently saw vocational education as a bridge to future possibilities. *'There is a lot that we are taught… it will help us with finding a job'*, said one student. Another added that the programme offered *'plenty of work opportunities'*. The belief that vocational pathways could lead to employment underpinned student perseverance and framed the system as an engine of hope, even where structural limitations persisted.

Still, goal orientation cannot be separated from social context. Students bring with them uneven educational backgrounds, varying levels of academic preparedness and differential access to support at home. The item *'I am in this course because all other courses were full'* loaded negatively (–0.54), underscoring the lack of meaningful choice available to some students. In such cases, aspirations may be present, but the capacity to realise them is constrained by structural conditions.

Student agency, then, is not a given. It is exercised in constrained contexts – limited by placement decisions, financial insecurity and domestic obligations. The negatively loading item *'I am in this course because all other courses were full'* (loading: –0.54) highlights how lack of choice undermines engagement. Even highly motivated students can feel disengaged when their aspirations are displaced by institutional pressures.

Despite these constraints, many students maintain a strong sense of purpose. The item *'Studying at the TVET college has increased the possibility of achieving my goals'* (loading: 0.55)

suggests that, for many, TVET education is experienced as a bridge to a better future. *'There is a lot that we are taught at school and college that will help us with finding a job; it will be much easier'* said one student. Others noted that the programme offered *'plenty of work opportunities'*, revealing a perceived link between education and employability. These perspectives support DHET's aspiration for TVET to become an institution of choice that expands employability and livelihood opportunities (DHET, 2013).

From a realist capability perspective, these findings show that student endowments must be seen not as static traits but as dynamic capabilities that are shaped by institutional processes, socio-economic conditions and personal histories. Even traits like time management and resilience are unequally distributed, not in terms of willpower, but in terms of students' life circumstances. For example, a student juggling academic work with family care, inadequate housing and financial stress may appear 'unmotivated' when in fact their capacity to act is simply overwhelmed by competing survival needs. While students demonstrated notable levels of agency and vision, their success depends on whether colleges and the broader system enable or inhibit that agency. A capability-friendly environment recognises not just what students bring, but what they need in order to thrive.

PC3: The broader skills development system: Systemic disjunctures and capability constraints

Principal component 3 (PC3), with an eigenvalue of 4.5, captures the external institutional conditions that shape student success, particularly the role of NSFAS and English as the language of instruction. While beyond the control of individual colleges, these factors emerged as critical conversion mechanisms that either enable or obstruct students' ability to turn educational access into success.

The strongest-loading variable was *'NSFAS is the biggest cause of student dropout at the college'* (loading: 0.68). Despite NSFAS's role in widening access, students reported severe administrative failures: delayed payments, unclear communication and inadequate support. *'Many students drop out during the waiting period of the NSFAS allowance,'* one student said. Others reported skipping meals or being evicted due to delays. These disruptions were especially gendered. The item *'NSFAS pushes girls into uncomfortable relationships with boyfriends who can help support them'* (loading: 0.57) points to the vulnerability students face when financial systems collapse. One student noted, *'We live in accommodation that is not accredited… some female students [turn to] immoral ways of raising money. Others drop out.'* NSFAS also contributed to long-term financial insecurity. The item *'NSFAS puts students and their families into debt'* (loading: 0.55) reveals how aid mechanisms, when mismanaged, may worsen the very inequalities they aim to redress. In these cases, the financial aid system intended to expand educational opportunity paradoxically exacerbates students' precarity – highlighting the importance of student financial aid serving as a meaningful opportunity, rather than as a resource provision that does not convert the educational opportunity into a meaningful opportunity but, instead, perhaps serves to expand multidimensional poverties.

The second major theme was the language of instruction. English is the medium of instruction, although most students speak it as an additional language. *'I would say, language is the barrier,'* one student stated. Another described a complex multilingual reality: *'I am 100% Xhosa… I get a lecturer that's Xhosa-speaking or Afrikaans-speaking, yet English is the medium of communication.'* Language affects more than comprehension, as it shapes students' confidence, ability to participate and sense of inclusion. Where students are forced to operate in a language in which they are not fully fluent, they may struggle to articulate their knowledge, interpret assessments or engage in classroom discussion. This creates a significant barrier in which existing knowledge and potential cannot be realised in academic performance. Some students attempted to overcome this challenge through peer-led multilingual study groups – an impressive display of agency but one that points to institutional failure to support learning in the linguistically diverse TVET context.

Mathematics also emerged as an important factor in academic performance, with concern that South African schoolchildren had the lowest competency out of 39 countries (Mullis et al., 2019). Mathematics components in TVET programmes thus decrease student success rates. As one college principal indicated, *'I think of engineering subjects, both at NCV level and Report 191; because of Mathematics they [are the more difficult], as you need Mathematics, or you should have… Mathematics.'*

In the realist capability approach, both NSFAS and language of instruction are not simply '*contextual*' variables; they are structural conditions that either support or suppress students' capabilities. Financial aid and instructional language are central to students' capability for learning with dignity, capability for continuity and capability for participation. When these mechanisms function poorly, the result is not just inconvenience or frustration but a severe capability deprivation.

It is worth noting that some support structures exist. University-based centres such as the Govan Mbeki Mathematics Development Centre and the Schools Development Unit have developed interventions to support TVET students and lecturers. Yet these initiatives remain marginal to core institutional practices.

The findings from PC3 reinforce a critical insight: student performance is inseparable from system performance. When financial systems are erratic, or language policies exclusionary, students' capabilities are eroded even before they set foot in a classroom. These are not simply operational issues – they are foundational to the kind of educational justice envisioned in the National Development Plan and the Sustainable Development Goals.

For TVET colleges to become truly inclusive institutions of choice, policy and planning must address these systemic disjunctures directly. NSFAS must be reformed not only to deliver funds efficiently, but also to support student dignity and academic focus. Similarly, language policy must be revisited to create space for multilingualism – not as a remedial measure, but as a resource for learning and teaching. Until these shifts are made, the broader skills development system will remain a barrier to, rather than a builder of, student capability.

PC4: Socio-economic situatedness – poverty, place and the persistence of structural inequality

The fourth principal component, socio-economic situatedness, with an eigenvalue of 2.8, reflects the socio-economic conditions in which students live – conditions that, while outside the direct control of the institution or the individual, profoundly affect learning. This includes multidimensional poverty, housing quality, access to basic services, household income and family responsibilities.

The survey data indicated strong associations between material deprivation and academic struggle. The items *'My home has tap water'* (loading: 0.42) and *'I live in an informal dwelling'* (loading: –0.37) reflected infrastructure deficits that directly affected students' learning environments. One student explained, *'There's usually no electricity, no water… the location where I am is also affecting my academics.'* Housing insecurity was a recurring theme; with 35% of respondents living in informal dwellings and over half from households reliant solely on social grants, students' lives are marked by financial precarity.

Many students were the first in their families to attend tertiary education. *'My parents are not educated. If I had not left my village, I don't think I would be studying today,'* said one student. Their determination often clashed with daily hardship. Crime, gender-based violence and poor health infrastructure compounded the instability of already marginalised communities. *'Students were being raped, students are poor, students have no support from home,'* noted one college principal.

Beyond housing, crime and violence in students' communities emerged as barriers to educational continuity. This context of everyday insecurity not only limits students' ability to study, but also heightens the risk of dropping out or disengagement. The survey item *'Have you repeated a level?'* (loading: 0.42) confirms that socio-economic pressures can directly interfere with academic progression. Repeating a level often results in the loss of NSFAS support, further compounding financial strain and decreasing students' ability to continue.

Importantly, the student voices in this study demonstrate not only vulnerability, but also resilience and determination. Many were first-generation tertiary students, navigating new systems without guidance. Their presence in college was itself a form of agency, a refusal to be defined by poverty. But as the realist capability approach reminds us, agency is not enough if it is persistently undermined by structural unfreedoms. Students can aspire, but without secure housing, electricity, safety or family support the conversion of aspiration into functioning becomes tenuous at best. As Nussbaum (2000) argues, capabilities must be understood in terms of real, rather than merely formal, freedom. A student may formally be 'enrolled' and have 'access' to a learning programme, but if they are hungry, unsafe and unsupported that access is hollow. Their capability to learn with dignity is effectively denied.

From a policy and planning perspective, PC4 compels us to reconsider the boundaries of institutional responsibility. While many of these challenges lie beyond the TVET college

per se, they intersect with student performance in inescapable ways. The idea that colleges can remain neutral or unaffected by social conditions is not just outdated, it is unachievable. A genuinely inclusive and just TVET system must be understood as part of broader skills ecosystems (see Powell, 2021; Lotz-Sisitka & McGrath, 2023) that works with housing, health, transport and social development sectors to create the enabling environments in which students can flourish.

Colleges themselves, and as they currently exist, can also play a role. Many students expressed appreciation for counselling, lecturer support and peer networks that helped them navigate the stress of poverty and marginalisation. These services, though often overstretched, represent sites of potential resilience-building and were consistently rated as crucial by learners, not just academically but emotionally and practically.

In conclusion, socio-economic situatedness is not a peripheral concern; it is a central determinant of performance in the South African TVET system. Addressing it requires not only intersectoral collaboration, but also a shift in mindset: from blaming students and lecturers for 'underperformance' to understanding performance as a negotiated outcome between individual agency and structural constraint.

Discussion: Beyond student deficits – understanding performance as conversion

The findings of this study offer compelling evidence that student performance at South African TVET colleges is shaped by a multidimensional constellation of factors: material, social, institutional and psychological. These factors do not operate in isolation, nor do they align neatly with the deficit explanations that have too often characterised discourse on student 'underperformance'. Instead, what emerges is a layered story of students navigating real opportunity gaps in their institutional environments, broader systemic structures and everyday lives.

At the heart of this analysis is a powerful convergence: the four-dimensional framework developed through the realist capability approach was not only conceptually coherent, but also empirically confirmed through the PCA, and then through the interviews. The same four domains – institutional endowments, student endowments, the broader skills development system, and socio-economic situatedness – surfaced both in theory and in students' lived accounts. This dual emergence strengthens the legitimacy of the framework and positions it as a powerful tool for both understanding and responding to the complex determinants of student success.

Rather than asking why TVET students 'fail', this study asks: what conditions are required for students to *succeed meaningfully*? The answer lies not in personal traits or effort alone, but in students' ability to convert available resources into valued outcomes – what the capability approach calls *functionings*. When conversion fails, it is often not due to a lack of student will, but a lack of enabling context. Consider, for instance, the student who is placed in a

programme they did not choose, or the one whose NSFAS allowance arrives late, threatening housing and food security. Or the student who knows the answer but cannot express it fluently in English. Or the student who returns each evening to an informal settlement without water or electricity. These are not students who lack motivation. These are students navigating an education and socio-economic systems that frequently fail to create the conditions necessary for their capabilities to expand.

The findings also demonstrate that institutional environments matter deeply. Where colleges are well managed, where lecturers are committed, where theory and practice are balanced, and where student support services are robust, students not only survive, they thrive. One student said it simply: *'Just don't give up.'* That sentiment was repeated often, but hope should not be a substitute for structure. Colleges must do more than inspire resilience; they must contribute to reducing the need for it.

The realist component of the framework invites us to examine how patterned structures – policies, funding systems, housing markets, language regimes – shape educational outcomes. But it also holds space for agency: the student who persists in the face of instability, the lecturer who arrives early and leaves late, the peer groups who form multilingual study circles to bridge the language gap. These are not heroic anomalies, they are signs that students and staff alike are making education work despite the system, not because of it.

This dual lens enables a richer understanding of performance. Students are not simply at risk; they also have agency. But agency, in this view, is never just a personal or individual asset. It is always relational: dependent on institutional responsiveness, systemic coherence and socio-economic infrastructure. To ignore this interdependence is to mistake constraint for failure.

The implications of this research extend beyond academic debate. If TVET colleges are to become institutions of choice – as envisioned by national policy – they must be redesigned as capability-enhancing spaces. That means moving beyond access to inclusion, and beyond curriculum coverage to pedagogical care.

Conclusion

This article set out to investigate the factors influencing student performance in South Africa's TVET colleges, not through a deficit lens but through the prism of the possibilities of what students might achieve when institutions and systems enable, rather than restrict, their capabilities. Drawing on the realist capability approach and supported by a mixed-methods design, the study produced a four-dimensional framework – emerging both theoretically and empirically – that captures the complex interplay of institutional, individual, systemic and socio-economic dynamics shaping academic outcomes.

The significance of this framework lies not only in its explanatory power, but also in its ethical stance. By shifting the unit of analysis from student performance to the conditions

that make performance possible, the study challenges longstanding narratives of failure. It demonstrates that what is often described as 'underachievement' is, in fact, a product of conversion failure of students being unable to turn access into achievement due to gaps in support, resources, recognition or basic security.

Theory and data coalescing around the four domains – institutional endowments, student endowments, the broader skills development system, and socio-economic situatedness – provides both a diagnostic map and a strategic guide. It directs attention not only to what students lack, but also to what the system must become. It urges us to design colleges, policies and funding mechanisms that support students as full human beings – not only as trainees for labour markets, but also as people seeking dignity, stability and a future.

In highlighting the key findings of this study, several recurring and deeply interrelated factors emerged as critical in shaping student performance. These include: the use of English as the sole language of instruction, which poses substantial barriers to comprehension and engagement for many students; the mathematics components of certain programmes, which continue to have a disproportionately negative effect on pass rates; and the ongoing challenges associated with NSFAS, including delayed disbursements and administrative bottlenecks. Inadequate infrastructure, insufficient student support services and the impact of multidimensional poverty, including housing insecurity, food instability and exposure to unsafe environments, further constrain students' ability to learn with dignity. These findings underscore the importance of attending to both systemic and institutional conversion factors if student capabilities are to be meaningfully expanded.

TVET students are not the 'weakest' in the system. They are among the most resilient. They are often first-generation, working-class, and under pressure to succeed against the odds. That many do succeed is a testament to their agency. But when they do not, the failure is rarely theirs alone. It is shared by the institutional environments that overlook them, by NSFAS that delays or excludes them, by the English tuition policy that alienates them, and by social conditions that compromise their ability to study, participate and flourish.

In response, this study offers not only critique, but also a framework for reimagining what success could mean in post-school education. It invites policymakers, practitioners and researchers to centre the question of capability: *What real opportunities do students have to succeed? And how might those opportunities be expanded?*

For future research, this framework could be used comparatively across regions or applied longitudinally to track how institutional and systemic reforms shape student trajectories over time. For policy, it offers a multidimensional tool for identifying bottlenecks and investing resources where they will have the greatest capability-expanding effect.

In the end, a just and effective TVET system cannot be built on the assumption that students must adapt to broken systems. Instead, it must be built on the commitment to repairing

those systems so they adapt to the lives, aspirations and realities of students. Only then can TVET become not a second choice, but a real pathway – to meaningful opportunities, to achievement and to lives that students have reason to value.

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Exploring the effects of stress on students at a technical and vocational education and training (TVET) college

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ABSTRACT

Students in technical and vocational education and training (TVET) colleges experience significant amounts of stress, which can affect their academic performance and their mental and physical health. This article reports on a study using the Lazarus theory of stress to examine the patterns and contextual factors affecting the stress experiences and coping mechanisms of a student group at a TVET college in South Africa. Student interviews and journal literature revealed the key factors contributing to student stress. These include financial constraints, social challenges, daily hardships and demanding academic workloads. The study highlights the importance of targeted support strategies to deal with the negative impacts of stress in technical and vocational education. Based on the findings, a number of recommendations to reduce the impact of stress on students are made.

KEYWORDS

Technical and vocational education and training (TVET); academic performance; stress experience; coping mechanism; support framework; social challenge

Introduction

Technical and vocational education and training (TVET) plays a crucial role in the post-school sector by providing for career-focused education and practical training in specialised skills for a variety of industries; in South Africa it has been transformed significantly since the apartheid regime ended in 1994 (Gaffoor & Van der Bijl, 2019). It is evident that these reforms have increased access to higher education and consequently the enrolment in TVET colleges has grown significantly during the past three decades. This presents new challenges to meeting the academic and social needs of the TVET student population (Buthelezi, 2018). In this changing landscape, there has been an increase in stress levels among TVET students (Buthelezi, 2018). Many of these students face financial difficulties, despite the fact that the majority of them obtain state-funded bursaries that pay for tuition and certain study-related expenses. However, according to a study conducted by Powell et al. (2024), bursary allowances are frequently insufficient to cover basic needs, including accommodation, food and toiletries. It can be especially difficult for students from low-income families to manage this funding gap. Some are consequently compelled to seek part-time jobs or to rely on family support when it is available; this might make it difficult for them to give their studies their full attention.

Many prospective TVET students qualify for a bursary from the National Student Financial Aid Scheme (NSFAS), which assists students who are struggling financially. Mafilika and Nkgabe (2024) state that, sometimes, NSFAS student allowances are not used as intended but are seen as a way to support the family. However, if bursary funding is used to support the family, the funds are insufficient to cover student fees and other expenses, such as travel costs. This is likely to contribute to students' elevated stress levels. As a result of stress, academic performance and emotional and social well-being could be negatively affected (Pariat et al. 2014).

According to a study by Herman et al. (2009), stress levels among students in South Africa have, notwithstanding the end of apartheid, risen as a result of economic instability, social challenges and academic pressures. Ruiz and Lopez (2024) point out that students are under pressure to perform well and to succeed in their studies in order to provide a way out of poverty for themselves and the rest of their family. This adds to their stress. The high stress levels experienced result in a range of emotional and physical symptoms such as headaches, fatigue, depression and anxiety (Dusselier et al., 2005). In the light of this, May (2015) believes that stress management is essential; this is because it has been discovered that individuals who employ efficient coping strategies report lower levels of anxiety than those who do not. Owusu and Essel (2017) emphasise that the first step towards preventing the destructive consequences of stress on academic success is to recognise and manage its causes and consequences. This is why many TVET colleges are exploring strategies to support students to develop additional coping mechanisms (Jonker, 2016).

Given the negative effects of stress on well-being and academic performance, it is critical to pinpoint the causes of stress and investigate the possible coping mechanisms. This article

describes a study that reviewed the way in which students dealt with stress using coping strategies. The students in the study were enrolled for a National Accredited Technical Education Diploma (NATED), NQF (National Qualifications Framework) N5, at a TVET college in Cape Town, South Africa. The college was chosen for convenience. The lower academic performance of students at the campus where the research was conducted, in comparison with other campuses of the same college, led to the site's purposeful selection for this research study. Although Business Studies students are enrolled at numerous campuses and at different NQF levels, this study concentrated on N5 students at a specific school to enable a more targeted and thorough examination of their experiences and difficulties. Focusing on N5 students is necessary because, although N4 students are the new intake, N5 students deal with a greater workload and more difficulties as a result of moving from N4 to N5. The study is useful because a deeper understanding of the students' experiences could help TVET colleges to develop a more conducive learning environment for all technical and vocational students. This could be achieved through the provision of targeted interventions and support mechanisms to reduce the negative effects of stress and to enhance students' educational experience.

To understand how stress affects students' experiences and coping strategies, this study sought to explore the following research questions:

1. What types of stress do students experience?
2. How do students perceive stress to be influencing their academic performance?
3. What coping strategies do students use?
4. How effective do students find their own coping strategies?

Stress and students

Stress is the result of both social and psychological factors. Social stress is the result of 'a relationship between individuals and their environment' (Lazarus & Folkman, 1984:19). Stress occurs when 'a relationship is deemed by the individual as taxing or exceeding their resources and endangering their well-being' (Lazarus & Folkman, 1984:19). In turn, psychological stress is the result of the coping methods available to an individual not being sufficient to enable them to cope with daily functions (Lazarus & Folkman, 1986). In this way, severe stress disrupts people's daily lives and functions and can force them to seek adjustments to their lives. However, not many people are able to do so without assistance (Bernstein et al., 2008).

Low programme completion rates, which can be linked to student stress, are one of the challenges facing TVET colleges (Lawrence, 2016). A most significant challenges that these institutions are now dealing with is the shortage of trained and experienced teachers (Lawrence, 2016). Many TVET colleges struggle to attract and retain skilled professionals who can teach the practical and theoretical components of their curriculum effectively. This shortage of qualified teaching staff often leads to suboptimal learning experiences for the

students; this is because they may not receive the hands-on training and specialised expertise needed to develop the necessary skills for the job market (Lawrence, 2016). As Gaffoor and Van der Bijl (2018) point out, students will experience stress when instructors lack both pedagogical skills and business-specific content knowledge, since this negatively affects their engagement and learning outcomes. A more recent study by Makibinyane and Khumalo (2021) shows that the persistently low throughput rates in South African TVET colleges are caused by academic difficulties, a lack of academic support and inadequate lecturer qualifications. This leads to less-satisfied students, who may drop out of college.

Studies have shown that academic stress driven by heavy workloads and performance pressures has a significant impact on students' mental health (Pierceall & Keim, 2007). Douce and Keeling (2014:1) argue that stress 'impairs learning: it decreases intellectual and emotional flexibility, weakens creativity and undermines interest in new knowledge, ideas and experiences'. Negative stress related to academic performance, according to Owusu and Essel (2017), is caused by factors such as an excessive workload; this might make a student feel that they have insufficient time to deal with all the subjects to the best of their ability. If not handled correctly, high levels of stress result in fatigue, depression and several other physical and emotional ailments. This can be exacerbated when education is combined with a 'busy life' such as working and studying when one has children (Owusu & Essel, 2017). These researchers have found that overloading students with work leads not only to academic stress, but also to mental and physical health problems, which hinder learning (Owusu & Essel, 2017). Another significant factor is financial stress, since students frequently struggle to pay for things such as food and transportation in addition to tuition (Lawrence, 2016). Personal challenges, including family responsibilities, further exacerbate stress levels (Sohail, 2013).

The academic achievement of students is heavily influenced by family factors. The main contributors to increased stress levels among students were identified in a study by Kai-Wen (2009) as social factors, a rise in poverty and the lack of resources available to many students. Students frequently balance the responsibilities of their studies, jobs and families, which leaves them with limited resources and financial support. The author pointed out that their mental and emotional health may suffer greatly as a result of the stress of juggling several obligations. This can extend to conflict in families that is often caused by a lack of understanding or support in the household or within the parent–child relationship (Kai-Wen, 2009).

Theoretical framework

Drawing on the theory proposed by Folkman and Lazarus (1980), the dynamic interplay between stress, coping mechanisms and academic success was examined. Stress can be seen as both a positive and a negative phenomenon when it is considered a challenge – which can lead to individuals adapting and responding in different ways. Our study was interested in ascertaining how individuals perceive stressors and how this affects their emotional responses.

In his work, Lazarus (1993) discussed coping mechanisms that can be employed in two ways: problem-focused coping, which involves actively modifying the external person–environment relationship; or emotion-focused coping, which involves modifying internal or personal meanings.

Problem-focused and emotion-focused coping differ in their approaches and intended outcomes, as illustrated in Table 1.

TABLE 1: Summary of coping strategies based on Lazarus (1993)

COPING STRATEGY	DESCRIPTION	EXAMPLES	OUTCOME
Problem-focused coping	Efforts are directed at behaviourally resolving distressing situations. Involves information-gathering, decision-making, conflict resolution and acquiring resources (knowledge, skills, abilities).	Situation-specific actions, task-oriented behaviours, and instrumental problem-solving.	A sense of mastery and control as an individual works towards goals.
Emotion-focused coping (positive reappraisal)	Focuses on reducing emotional distress by reinterpreting situations to make them more manageable or meaningful. Focuses on internal responses to stress rather than the external problem itself.	Positive reframing, shifting perspective and focusing on personal growth arising from the experience.	Reduces disparity between situational demands and personal capacity.

The theoretical framework of Lazarus (1966) guided the examination of stress predispositions and coping mechanisms, recognising as it does the influence of both personal and situational factors on stress management. This theory states that an individual's appraisal of events, based on the way they evaluate the significance of events, influences their emotional response and perception of stress. Lazarus and Folkman (1984) identified three types of appraisal: harm, threat and challenge; and they distinguished between primary and secondary appraisals of events. Three components of primary appraisals are evident:

1. Irrelevant, where the individual has no stake in the transaction or outcome;
2. Positive, where the individual believes the situation is positive with no potential negative consequences; and
3. Stressful, where the individual perceives only negative consequences or that the circumstances will lead to an adverse effect.

In secondary appraisals, these perceptions would be used to determine the extent of the harm caused by an event. The concept of harm or loss refers to the belief that one has suffered physical harm or emotional loss in the past. There is a threat of future harm or loss when there is an expectation of this happening again in the future. These appraisals influence the ways in which individuals perceive stress and cope with it, therefore emphasising the importance of having effective coping mechanisms in place to manage stress.

A study conducted in the university of technology sector highlights the importance of coping mechanisms and resilience in managing academic stress and improving the performance of students (Thomas et al., 2022). According to the study, resilience is associated with positive attributes such as being able to adapt to, overcome and recover from stressors. Expanding on this concept, resilience theory is also important to understanding the way in which students deal with stress in their personal and academic lives. The ability to overcome hardship, preserve well-being and even develop through trying times is known as resilience (Masten, 2001; Ungar, 2012). Resilience theory acknowledges that people can build coping mechanisms, adaptive techniques and personal qualities in response to stress rather than only seeing it as a disruptive force. Resilience is essential for students who have to juggle many responsibilities and demanding academic standards in the context of this study. These results imply that encouraging student resilience could operate as a protective factor, enabling them to persevere in the face of adversity.

To achieve academic success and personal growth, students should use coping mechanisms such as support and talking to their peers (Thomas et al., 2022). El-Ghoroury et al. (2012) determined that the most popular coping method used for managing stress was receiving support from friends, family and other students. Owusu and Essel (2017) have suggested that introducing successful coping strategies to students might help them to avoid the harmful consequences of extreme stress. Therefore, the importance of understanding perceived stress, its effects on college students and the way that students manage it is clearly valuable. However, Moir (2014) has stated that the use of coping mechanisms may not meet the needs of all students because such mechanisms have limitations and some students may require more extensive support. In addition to the lack of workshops on financial management and time management on campus, there are also support services such as counselling that may not be optimally used by students (Lawrence, 2016). As a result, developing a support system that is effective requires overcoming the shortfalls described. Therefore, this research will be beneficial to exploring the stressors as perceived by students themselves, and to assisting executive management, educators and policymakers at higher education institutions, by providing recommendations for measures to mitigate this challenge.

Methodology

An interpretivist approach was applied to the study to deepen our understanding of the subjective realities of the participants. This approach provided the researchers with an opportunity to view stress through the participants' own perceptions and experiences (Creswell, 2007). An important part of the research was to request the participating students to keep a detailed journal of their thoughts, feelings and experiences related to stress during a period of six months. The qualitative data collected during that six-month period provided valuable first-hand accounts and perspectives for the researcher from the seven students who submitted the journals that they kept. In addition to the journals, the researcher conducted in-depth individual interviews with 14 students. Insights from the

data collected were considered together with the journals of the participant students to determine the effects of stress on their sense of well-being. Instead of providing names, each interviewee was given the code name 'Participant' and a unique number. For example, 'P1'was used for Participant 1, 'Int1' for Interview dataset 1, and 'J' followed by a unique participant number was used to indicate the journal entry (e.g. 'J3'). During the interviews, the researcher engaged deeply with the participants to find out about their personal experiences and perceptions of stress, in addition to their own responses to stress. As a result of this approach, the researcher was able to make sense of the data by analysing the students' diverse perspectives, which provided a nuanced understanding of the way stress is experienced and managed by students in the TVET sector.

Research design

A qualitative research design and a narrative research tradition were applied through the use of, for instance, telephonic interviews using a narrative approach (Kvale, 2003). Narrative interviews provide a naturalistic view of the students in their natural environment in which sense is made of a phenomenon and the meaning that students attach to this phenomenon (Denzin & Lincoln, 2013). The natural environment in this research was the institution which the students attended and the phenomenon being studied was the students' stress and their current coping mechanisms.

Data collection and site selection

One TVET college in Cape Town, South Africa, was selected for this study. Business Studies N4–N6 is offered at two campuses of the college and most of the students receive bursaries from the National Student Financial Aid Scheme (NSFAS, 2018). The NATED Business Studies course includes an 18-month theoretical and an 18-month practical course. The NQF 4 Certificate takes six months to complete and another 12 months to complete NQF 5 and NQF 6 (i.e. 18 months in total). However, for students to be NQF-certified, they must complete an additional 18-month practical component (workplace learning) and hand in a portfolio of evidence. Students must demonstrate their skills through practical work, in this way preparing themselves for employment in industries that demand these skills.

The data were collected during the Covid-19 pandemic; therefore, telephonic interviews were used as an alternative to face-to-face sessions. This demonstrated the flexibility of collecting interview data from participants who, for whatever reason, might not be able to attend a face-to-face interview. There were 90 students, all of whom were invited to participate in the study; of these, 19 students aged 18 years or older volunteered to participate. Of the 19 students, only 14 agreed to participate in the in-depth interviews to enable the researcher to learn more about the difficulties they encountered in dealing with stress. Each participant was interviewed twice, once in January, at the beginning of the semester, and once at the end of the academic semester, in June. The reason for conducting two interviews at different

times was to ascertain whether the students' experiences changed at all during the course of the semester; the data indicated that minimal change had occurred.

The researchers requested the students to keep a record in their journals of any stressful events that they experienced during the period when the research was conducted (i.e. between January and June). They were requested to express their thoughts and opinions freely about their stressful circumstances, how they experienced stress and the coping strategies they used to manage it. However, only seven participants were comfortable about returning the journals that they had kept during the six-month research period.

The information gleaned from the two interviews with each participant was substantiated by their journal entries. Insights from the data collected from the interviews were considered together with the seven participants' journals to explore their experience of stress. This was done to respond to the research questions about what their key stressors were and how useful and effective their current coping mechanisms were. Many of the statements made during the interviews were repeated in these journals.

Ethical approval was obtained from the Research Ethics Committee of a higher education institution in the region and the relevant government department. The TVET college gave permission for the study to take place on two of the college campuses. Informed consent was obtained from the participating students before conducting the interviews. The research details and the purpose of the research were clearly explained to the participants and their confidentiality and privacy were respected. The data collected were used for this study only and were stored on a password-protected computer, to which only the researchers had access.

Data analysis

The data were analysed by means of thematic analysis to examine transcripts from the interviews and the written journals. This method entailed pinpointing, analysing and documenting recurring patterns (themes) in the data and providing a comprehensive and in-depth portrayal of the dataset (Howitt & Cramer, 2007). Each participant's responses to the interview questions were recorded and transcribed verbatim into a Microsoft Word document. Following that, the researcher identified codes, which were then organised into categories. Based on these categories, themes and sub-themes were identified and indicated, with corresponding direct quotations. The journal data-coding process was guided by the thematic analysis of the interview data. The journal entries clarified and sometimes elaborated on some of the matters discussed in the interviews.

Findings

This section presents the data, based on four identified themes. The first three themes are factors relating to the stressors experienced by the students and the fourth theme focuses on the effectiveness of the current support and coping mechanisms used by the participants.

The themes and sub-themes are represented graphically below:

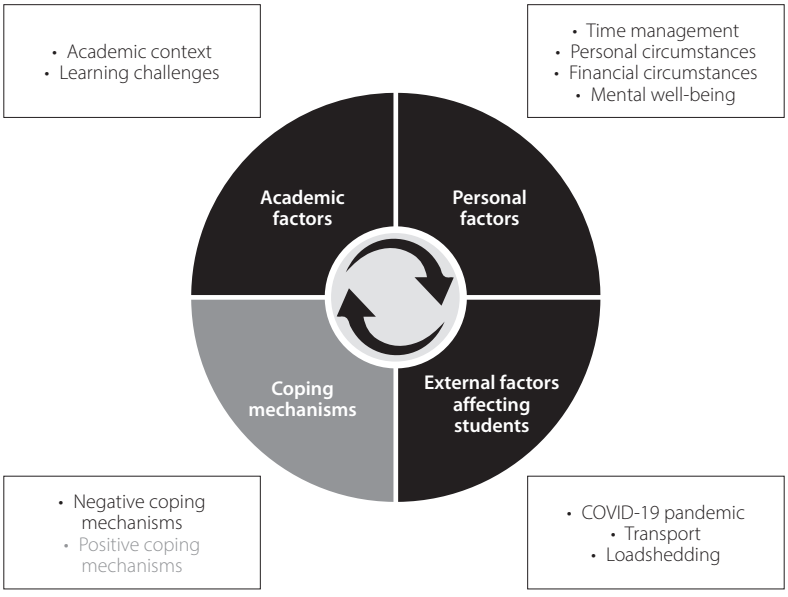

FIGURE 1: Graphical representation of the themes and sub-themes

Source: Authors' own.

Theme 1: Academic factors

The students indicated that they experienced various academic challenges daily. At times, the workload was seen as excessive. They struggled to grasp the work, especially if lecturers left and were replaced by new lecturers. This occurred when a lecturer was transferred to another department, and, more frequently, during Covid-19, owing to lecturers falling ill and temporary lecturers being employed. This was a challenge, as many students indicated that they struggled to adapt to a new lecturer's way of doing things, as seen from one of the journal entries below:

> One lecturer has not come to college for three weeks, so we [are] missing out on a lot of work and this is stressful. [I] lack … understanding [of] the work; some of [the] things [are] explained [and] I do not understand. Studying three subjects in a row with no off-time in between makes me feel stressed because of the pressure. Getting a new lecturer [has made] things more difficult. This lecturer is different to the other one so I must adjust and it disturbs my focus. [P4: J4]

When asked about further stressors that influenced their daily lives, a number of the students indicated that they could not cope with multiple academic tasks all at once. The work accumulated and then the workload could become overwhelming, especially when the

student did not have a lecturer consistently present or when the lecturer did not explain the work clearly. The students then spent time trying to figure out what was expected of them to pass or reach their desired academic goal. This is similar to the findings by Owusu and Essel (2017), who found that students who were overloaded with work experienced academic stress that led to mental and health problems, which interfered with their learning.

Interview data confirm the above statement, with participants stating:

> Yes, definitely. Definitely! Because this year has been extremely tough … . […] N5 has just been more difficult than N4 for some reason. [P1: Int2]

Another participant generalised the stress-related workload statement and commented:

> Personally, I feel that stress to me – it actually comes down to a lot of things, a lot of things that you need to handle day by day. [P6: Int1]

P3 stated:

> The work – it's too much sometimes. It is too much work, Ma'am … it's just like they give too much work and it's a lot of pressure. [P3: Int2]

Overwhelmed by their workload, a number of the participants struggled to cope. This is supported by Kai-Wen (2009) and also by Galanakis et al. (2016) who state that increased academic workloads significantly increase stress levels. Researchers have discovered that overloading students leads not only to academic stress, but also to mental and physical health problems which hinder learning (Galanakis et al., 2016:688).

Theme 2: Personal factors

Personal stress involved socio-economic factors. These contributed to feelings of stress and thus influenced the students' academic lives. Personal obstacles could lead to stress and negatively affect students academically. Several factors were identified, including family responsibilities, child-rearing and financial responsibilities, as factors that contributed to their stress. Stress also entailed feelings of fear, anxiety and depression that hindered progress or caused students to lose focus. The students' emotions were at times so overwhelming that they were not able to manage their daily tasks. They could become withdrawn when they did not have the correct coping strategies. Fear of the unknown and not knowing what the future had in store for them also led to stress. The challenges and pressures of life could also be a barrier to success.

The participants discussed and shared information about how personal factors, such as their home environment, contributed to their feelings of stress and about how it influenced their academic life. One participant experienced a great deal of pressure associated with their academic studies and personal responsibilities:

> N5 has just been more difficult than N4 for some reason and it's more pressure on us because of my home situation as well. Like, maybe, when you are going through something at home, and then it's just that one thing that you think about all the time. I live with a two-year-old also now. He is not my biological brother, so it's not easy to get around to my studies because I must take care of him while my mother [is] working. [P1: Int2]

Some participants also mentioned household stress and the frustration of having to study while having to attend to other household matters:

> I mentioned I'm at home and I must study from home … [with] children [being] here. I don't like doing everything at one time and … with Covid-19 I must study; it's hard to study [and] just stay at home. I stress out and I take it out on my sister and I take it out on the kids because I feel a lot [of] anger because of it. [P7: Int2]

It is evident from the participants' input that the previously mentioned personal issues caused both stress and interfered with their ability to study. Some individuals believed that, before they could focus on their education, they had to take care of their household duties. A number of the participants were mothers, wives, breadwinners or guardians and they struggled to cope because they lacked the support of their loved ones. Given that women reported these roles and expectations more often than males, this tends to indicate a gendered aspect to stress. Women, who frequently find themselves torn between conflicting priorities, are further burdened by the combination of caring and household duties, on the one hand, and academic work commitments, on the other. In addition to raising stress levels, this draws attention to systematic gaps in the support networks accessible to working or mature female students. Male participants, in contrast, were less likely to raise such obligations, which tends to indicate that men and women perceive and deal with stress differently.

Lawrence (2016:25) mentions the financial challenges that students experience and explains that students are reliant on bursaries. The researcher found that the participants' financial stress was a great burden, as this hindered their going to college. Older participants experienced the guilt of studying full-time and felt obliged to use the bursary money to provide for, and contribute to satisfying, their family's day-to-day needs. This was additionally stressful because it meant choosing between satisfying the family's needs and the participant's needs, and this therefore influenced their academic performance.

The participants supported the above statement:

> I have bills, I have a child, I have a home that I have to take care of because none of the people that I live with are employed right now, so we're struggling financially. [P2: Int1]

Another participant also expressed this concern:

> Financially, I am stressed because there is no income [coming] in, [as] everyone is locked in and some of the people are not allowed … to go to work [yet], so that's stressing me. [P5: Int2]

These individuals experience many stressors, and the participants explained that this takes its toll on them in many ways. Some participants did not have solutions to the problems or to the challenges they were facing. This caused a build-up of stress over a long period and had a negative effect on their overall well-being, which is discussed in the next point.

Dusselier et al. (2005:15) have pointed out that stress is both physical and emotional. In the absence of relief from stress, distress can occur as a negative response that disturbs the body's internal balance, causing physical symptoms. These include headaches, an upset stomach, elevated blood pressure, chest pain, sexual dysfunction and sleeping difficulties, in addition to emotional problems such as depression, anxiety and panic attacks. Stress and anxiety therefore affect the general well-being of individuals. These problems were clearly identified by the participants, who mentioned that the stressors became so overwhelming that they led to depression and to their feeling drained and moody. This, in turn, affected their academic performance and they noticed that their grades were lower than usual. It was also suggested that academic stress is the single-most dominant stress factor affecting college students' mental health. However, stress may be more prevalent in some groups of students than others. Theme 2 describes how feelings of uncertainty could confuse or overwhelm students and consequently may affect their academic performance.

A journal entry similarly confirms the above statements:

> That's what I experience. It makes you sick, you get headaches. It's a lot of stress; you can't eat, all that stuff. [P4: J4]

A number of the participants felt that these stressful emotions became so overwhelming at times that they led to depression; they made statements similar to the one below:

> I feel like I'm going into depression mode because there's not much that I can do about what is happening, you see. [The number] of thoughts … just overwhelm you, [with you] not being able to control your emotions [at] all. [P2: Int2]

Many students felt that they could not focus properly when under immense pressure. Their minds were either focused on other concerns such as negative feelings about themselves or they lacked the motivation to go on. They had no correct way of keeping their minds or feelings under control and therefore they reacted negatively and were not able to function well.

Time management was also one of their stress factors. Not having a structure or a plan for how to approach certain subjects and not knowing which subjects to focus on or prioritise led to students' experiencing many feelings of stress and anxiety. Owusu and Essel (2017:23) have suggested that having too much academic work can also increase students' stress levels because they think they will not have enough time to deal with everything properly. Because of these feelings of incompetence, tension and stress will negatively affect their academic performance.

Many of the participants found that having too many matters to attend to at once led to greater stress levels. As one participant stated:

> It's a lot on my plate. [For instance,] every day I need to [have a] schedule: this is what I'm going to do this time of the day; this is what I'm going to do when I get home from college. [P6: Int1]

Another participant found it challenging to meet deadlines, stating what a challenge it was:

> to [actually] get the work … done on time. [P11: Int2]

The cause of the stress was therefore a personal time management challenge, as the participant indicated:

> I'm […] a person [who procrastinates], you know. So, I leave everything to the last minute, then [I stress]; [like having] two weeks to do stuff and […] that [is] very, very stressful. [P12: Int2]

The participants clearly indicated that the stress and anxiety they experienced as a result of not having the correct mechanisms in place, led to frustration. Having too many responsibilities, and other factors contributing to their stress, caused the participants to feel that they did not have the energy to find solutions to their challenges. Research by Cahir and Morris (1991:414) shows that time management reduces stress levels in students.

Theme 3: External factors affecting students

At times, there were external factors that were beyond the students' control, such as transport and Covid-19. A number of factors related to Covid-19 were identified that hindered students, such as not having sufficient resources or contact time with their lecturers for extra support. Often, students cannot study effectively without receiving guidance from their lecturers. According to a study conducted by Shaik et al. (2022), students across the globe face challenges, especially during the Covid-19 pandemic. During this time, lecturers were under pressure to support students remotely, but many students had limited resources and were often able to access only inexpensive night-time data. The lack of sufficient resources

and the reduced contact time between students and lecturers significantly inhibited the academic performance of the students and increased their levels of stress.

The participants stated repeatedly how Covid-19 had affected their studies. One mentioned the following:

> With Covid-19, I must study. It's hard to study [and] just stay at home; […] it really puts a lot of [pressure] on me – I'm working […] really hard and now this pandemic. [P7: Int1]

Another participant indicated:

> With this whole virus, you're going back to college but now you don't know, are you safe? [P12: Int1]

Visser and Law-Van Wyk (2021) have pointed out the significant impact of the Covid-19 pandemic on the mental well-being of college students, with some being more stressed than others owing to economic instability, unemployment, stress, anxiety and feelings of insecurity. As a result of anxiety about the way forward after Covid-19, students reported feeling anxious about their academic future. In addition, after Covid-19, some lecturers preferred a blended approach to teaching and learning and the students, who found it challenging to adjust to the online learning context, reported a lack of guidance from lecturers.

The students mentioned that job loss and other factors such as transport problems prevented them from attending their classes and had a negative effect on their performance. Transport challenges included not knowing how to get to the college or experiencing stress when having to travel on public transport; these factors prevented the students from attending classes and they therefore missed out on receiving important information.

One participant confirmed the stress caused by having to use public transport:

> [T]ravelling to college is a major stress factor because I make use of public transport. [P4: Int2]

Another participant added:

> […] I'm worrying about how I'm going to get [to college] the next day […] or how I'm going to get home. [P9: Int2]

Apart from transport concerns, rolling blackouts during load-shedding affected the students, as they were not able to study or do their homework in the dark. Kai-Wen (2009) has indicated that the effects of social–environmental events such as load-shedding on academic performance and education in general are multifaceted.

One of the participants expressed their stress about load-shedding and their studies:

> […] it's causing a lot of stress, especially from [indistinct] because [of] load shedding. [P12: Int1]

Another student's journal entry also mentioned this:

> Load-shedding is a problem for me and my studies. [P4: J4]

These statements attest to the fact that a number of the students did not have control over the external factors that directly affected them, such as job losses or transport that they needed to take to them to where they were required to be. Some students relied on public transport, otherwise they would have been stranded. This directly affected their academic performance and caused them to miss classes and assessments.

Theme 4: Coping mechanisms

The coping mechanisms that students used were either negative and unhealthy or positive and healthy. Many coping mechanisms were described by the students, even if they were not necessarily positive coping mechanisms. Unhealthy coping mechanisms included resorting to alcohol or drugs to forget their troubles; other negative mechanisms included frequent crying and then isolating themselves. The healthier methods were, for example, writing in a journal or speaking to someone. A number of the students chose these positive options.

In their journal, one student mentioned another positive coping mechanism:

> Jogging sessions help me relieve stress. [P3: J3]

Another participant mentioned in an interview:

> I'll jog or join a couple of friends for a jog in the morning and [do a few] exercises […] . [P5: Int1]

Some participants would find relief by exercising and others found relief in the journal-writing. Many of the journal entries indicated that this research study helped them to deal with their stress:

> [The] journal helped [to relieve] my anxiety and stress. [P1: J1]

In similar vein, another journal entry stated that the present research had assisted them positively:

> Diary [entries] helped me reflect and grow in these past months. [P3: J3]

Negative coping methods were employed when the participants did not have the correct support structures in place. Below are opposing views on the coping mechanisms, in which participants mentioned unhealthy lifestyle choices. This was evident largely in the participants' interviews. Some of life's pressures became overwhelming to the extent that it became difficult for some of the participants to cope and persevere with their studies.

One of the participants confirmed this by stating:

> What generally makes me feel better is drinking, so I would just buy myself a bottle of wine and drink it all up. [P2: Int2]

Another participant stated:

> I'm a nail-biter, Ma'am. And I tend to smoke. [P4: Int1]

Yet another participant dealt with her stress differently:

> I cry a lot. Whenever I feel overwhelmed because of stress I go to my room and cry a lot. [P5: Int1]

One other participant responded as follows:

> I just go to sleep; I sleep all day. [P10: Int1]

These statements indicate that the participants believed the coping mechanisms that they used helped them. But they did not realise at the time that these choices only made them feel worse and did not help them to deal with the challenges they faced.

As discussed above, Sohail (2013) has mentioned that stress can be very harmful to a person's physical and mental health. These negative coping mechanisms indicate the need to develop coping strategies to reduce stress, which is necessary to prevent the harmful effects of prolonged stress.

The word-cloud visualisation in Figure 2 effectively highlights the dominant vocabulary that emerged from the participant interviews and from the journal entries which were collected during a six-month period. They provide valuable insights into students' perspectives and experiences. Words such as 'Covid', 'lockdown', 'study', 'negative' and 'academic' were most frequently mentioned and they express what contributed to the participants' overall experiences of stress.

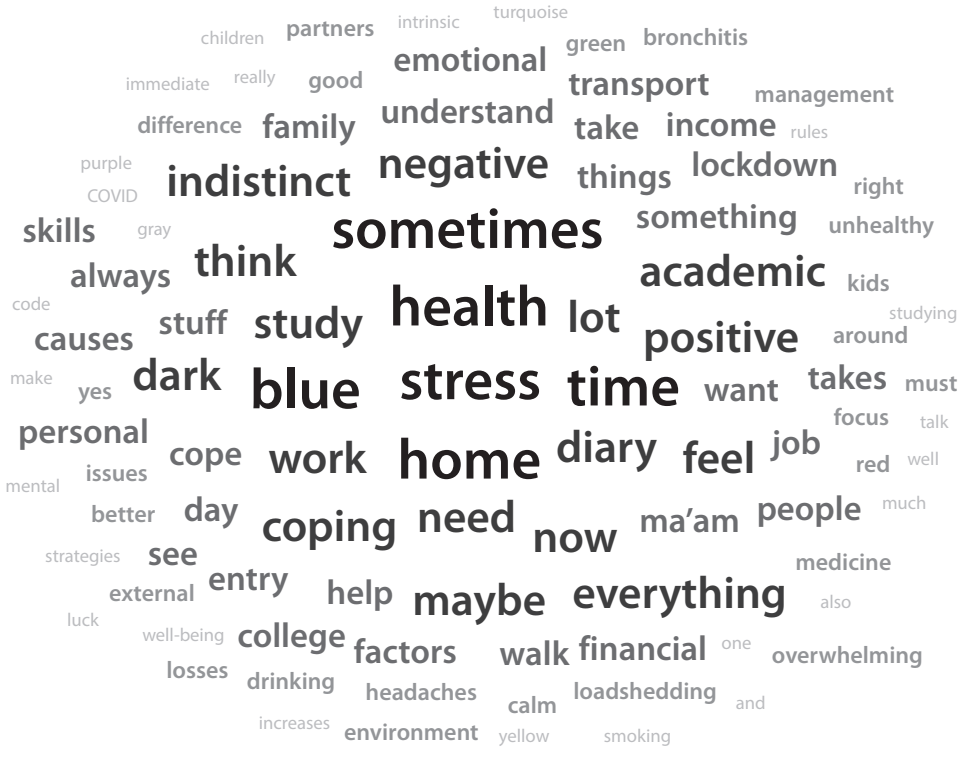

FIGURE 2: Word-cloud of the most frequent words used during the interviews

Source: Authors' own

Discussion

Gaffoor and Van der Bijl (2018) point out that, when instructors are underqualified, such as those lacking both pedagogical skills and business-specific content knowledge, this causes students to experience stress, which negatively affects their engagement and learning outcomes. In a previous study by Makibinyane and Khumalo (2021), it was found that academic difficulties, poor academic support and unqualified lecturers resulted in a higher risk of students dropping out of college if they were not satisfied with their progress. These factors contribute to the persistently low throughput rates in South African TVET colleges.

The present study indicates that students are experiencing stress and that there is an urgent need for a multifaceted approach to handle this problem effectively. The stressors identified are apparently commonly experienced by students (Gaffoor & Van der Bijl, 2018); however, the data suggest that the pandemic made these stressors worse for students. This aligns with the study of Makibinyane and Khumalo (2021) conducted during the pandemic. It is therefore likely that the stress levels experienced by the participants in this study would have been lower in the absence of Covid-19. This means that the interpretation of the results

should take account of the pandemic that played a unique role in influencing students' experiences and contributing to their stress.

The participants in this study mentioned coping methods such as exercise or sitting alone and praying as some form of meditation as being helpful in dealing with stressful situations. Research suggests that students who practise meditation, play games and use support groups show improved coping skills and knowledge of stress (Shaikh et al., 2004). Therefore, providing students with the necessary tools and resources to manage their stress levels effectively requires targeted interventions. These interventions include stress management workshops and establishing dedicated student wellness spaces in which students are able to comfortably seek peer support or participate in mentoring programmes. Workshops on mindfulness and mental health could also be incorporated as modules into the Life Skills curriculum. Students could benefit from these interventions, as they would help them to develop a deeper understanding of stressors, including their nature and their antidotes or cures. This would enable them to recognise their internal and external support systems and to cultivate effective stress management strategies to help them with the demands of student life. By offering these diverse coping mechanisms, TVET colleges could help to mitigate the severity of stressors and build student resilience (Pierceall & Keim, 2007).

The implementation of workshops that focus on managing the causes of stress and on stress management practices – such as being taught how to be mindful, time management skills and relaxation techniques – would be extremely beneficial to students. According to Lazarus's theory (1993), social support is one of the most important coping resources. Workshops such as these should provide students with practical skills and strategies to help them to navigate the demands of academic life more effectively.

At present, the service provided at the research site is limited to a campus unit called Student Support Services. Expanding the service and encouraging students to talk to family and friends as a way to help them cope with high levels of stress could be beneficial (Pierceall & Keim, 2007).

Another finding of this study is that the participants greatly benefited from keeping a journal as a means of reducing stress. Incorporating Lazarus's theory (1993) into this recommendation underscores the effectiveness of journal-writing as a coping mechanism. Lazarus's theory emphasises the significance of cognitive appraisal in the stress response, where individuals assess the importance of a stressor (primary appraisal) and their ability to cope with it (secondary appraisal). Implementing journal-writing as a reflective process can help students to understand their stress triggers better and to develop more effective ways of coping with them.

The students also mentioned that jogging and exercising provided a sense of relief from stress. However, the data indicate a lack of recreational activities at the college such as sport,

art or music that could have provided the students with much-needed stress relief and personal expression. Engaging in these activities could also help students to maintain a healthy work–life balance, enhance their overall well-being and improve their academic performance. Pierceall and Keim (2007) support this notion by affirming that recreational activities and exercise can help students to cope effectively with high levels of stress. In addition, by adopting this comprehensive approach, educational institutions are able to create a supportive environment that deals with the various aspects of student stress, enabling students to manage their stress, excel academically and enjoy a positive educational experience.

Furthermore, a study by Bester (2023) found that it is important to incorporate well-being into the strategic plans of educational institutions. Bester (2023) also indicates that TVET leaders must prioritise well-being and integrate it into the institutions' overall strategy, much like the comprehensive approach to stress management discussed earlier in this article. In addition, Bester's findings highlight the need for holistic wellness initiatives to be introduced that focus on various aspects of well-being, such as cognitive, emotional, physical and social dimensions, especially those that align with the multidimensional approach proposed in this study.

Limitations

Although this study provides insightful information about the ways students cope with stress, it is crucial to acknowledge some limitations, especially regarding the methodology of the study. Although the sample offered rich, in-depth narratives, the results of this qualitative study, which included only 14 participants from one Western Cape TVET college, cannot be generalised to the entire population of students. Future research may benefit from using quantitative techniques such as surveys to collect data from a broader and more diverse set of students across several institutions. This would improve the applicability and generalisability of the findings. In addition, there is a known risk of social desirability bias (SDB) when using interviews and reflective journals. This is because the participants may give those answers they believe are expected or which show themselves in a more positive manner. Despite this possible drawback, the data did not indicate that the participants withheld information or overstated their experiences. On the contrary, a number of the participants revealed vulnerable and intimate stories, indicating a degree of trust and transparency in their contributions. Nonetheless, the potential for SDB was taken into account throughout the data processing and steps, including preserving anonymity and posing open-ended, non-leading questions, were introduced to guarantee reducing the risk of SDB. Folkman and Lazarus's (1980) stress and coping theory served as the study's compass and offered a helpful perspective through which to view the ways in which students perceive and react to stress. However, our taking into account more extensive systemic and contextual influences on student well-being, integrating complementary theoretical approaches such as ecological models and resilience theory, could have deepened the analysis. Finally, the implications of the results are restricted by their exclusive focus on one institutional environment. To find out whether these results

would apply in different contexts or if context-specific characteristics are important, future studies should investigate comparable questions in several institutions or provinces.

Conclusion

The aims of this study were to shed light on the stress that students in a TVET setting experience and to implement effective support strategies at TVET colleges. Appropriate support strategies could reduce these stressors and promote an environment conducive to a healthier, more productive learning environment. A comprehensive understanding of the complex interactions between cognitive appraisals, coping mechanisms and stress outcomes can be gained from Lazarus's theory (1966). This theory stresses the importance of both internal and external coping mechanisms to support students in managing stress effectively and enhancing their academic performance and overall well-being. TVET colleges and the academics at them need to harness their powerful influence and work together to build a more inclusive future. Researchers should continue investigating efficient ways to manage stress and evaluate their effect on student performance. This study adds to the ongoing research on stress experienced by students at TVET colleges by revealing the specific stressors faced by a cohort of TVET students and making recommendations regarding the way in which these challenges could be managed. Future studies could possibly build upon these findings to improve interventions and support systems that promote both the academic achievement and the overall well-being of students in comparable educational environments.

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Using a design-based research approach to improve Financial Mathematics comprehension among vocational college students

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ABSTRACT

This study examined challenges in understanding Financial Mathematics in technical and vocational education and training (TVET) colleges, where abstract concepts and traditional pedagogy impede comprehension. The aim was to improve understanding through systematic error analysis embedded in a design-based research (DBR) approach. Situated Learning Theory (SLT) framed the work by foregrounding authentic tasks, participation, and iterative refinement of instruction. Two purposively selected National Certificate (Vocational) Level 2 classes formed the target group. Iterative cycles of design, implementation, and analysis drew on preparatory examination scripts, classroom feedback, and formative assessment to diagnose misconceptions and inform successive prototypes. Many students struggled with definitions. Contextually grounded activities and personalised feedback improved conceptual clarity and performance.

KEYWORDS

Financial Mathematics; technical and vocational education and training (TVET); design-based research; error analysis; Situated Learning Theory; NC(V)

Introduction and background

The present study was conducted in respect of the National Certificate (Vocational) (NC(V)) Level 2 Mathematics Engineering programme at a technical and vocational education and training (TVET) college where Mathematics is a core subject. This curriculum integrates Financial Mathematics into the broader mathematics framework rather than it existing as a separate component within Pure Mathematics (DHET, 2011). Explicitly designed for Engineering students, this integration ensures that Financial Mathematics is not treated as an isolated subject but as a fundamental skill that is essential to academic progression and real-world application. The subject equips students with practical financial competencies, including calculating interest rates, managing annuities, understanding schedules and performing investment appraisals (Dos Santos et al., 2016). These skills are crucial to making informed financial decisions in both professional and personal contexts, and they serve to reinforce the essential role of financial literacy in technical and vocational education.

Despite its importance, mastering Financial Mathematics poses significant challenges for students in TVET colleges. In South Africa, TVET colleges provide vocational and occupational programmes, including the (NC(V)), which aim to equip students with both academic knowledge and practical skills. The inherently abstract nature of financial concepts, compounded by a lack of contextual learning and reliance on traditional pedagogical strategies, makes it difficult for students to fully grasp and apply these concepts (Makonye, 2020). The present study was guided by situated learning theory (SLT) (Lave & Wenger, 1991) and emphasised learning through participation in authentic real-life contexts. The abstract nature of Financial Mathematics and its disconnection from students' lived experiences make this theory especially relevant to designing interventions that embed learning within meaningful financial practices. Dos Santos et al. (2016) underscore the need for contextualised teaching approaches in TVET settings, noting that traditional methods often fail to connect mathematical content to real-world scenarios, which can hinder students' comprehension.

Our review of the literature indicated that there is limited research on this topic, particularly in the context of TVET colleges. This gap in the literature underscores the importance of this study, as it contributes to the ongoing debate in an essential realm of Mathematics. This is crucial not only for students' financial benefit but also for their professional decision-making capabilities. Closing this gap is vital, as Financial Mathematics is a critical skill that supports both individual financial literacy and professional competence.

As a result of these abstract concepts, students in TVET colleges often struggle to understand the practical implications of Financial Mathematics, which leaves gaps in their knowledge and skills (Khalo et al., 2022). While Hernández-Cortes et al. (2023) highlighted similar challenges in understanding Financial Mathematics, the context of the current study differs significantly, as it focuses specifically on the unique challenges faced in TVET colleges; these institutions have distinct educational needs and environments compared with other educational settings. Traditional teaching methods, which frequently rely on rote

memorisation and procedural learning, lack the necessary real-world context that would make these financial concepts more accessible and relevant to students' daily lives (De Souza et al., 2024). These authors also state that this approach does not foster deep understanding or critical thinking; this results in ill-equipped students who are unable to apply Financial Mathematics effectively in both their academic and real-world situations.

Resolving these challenges requires innovative teaching methods that convey the theoretical underpinnings of Financial Mathematics and enhance students' critical thinking and problem-solving abilities. This study aimed to achieve this by integrating error analysis within a design-based research (DBR) approach. The DBR approach allows for an iterative design, implementation, and refinement of instructional strategies based on empirical data and student feedback. Furthermore, the study used SLT as the lens through which to interpret the findings. By focusing on the students' misconceptions and cognitive processes through examining their errors, this approach provided a more tailored and effective learning experience.

The study was designed to offer contextualised learning experiences that bridge the gap between theoretical concepts and real-world applications. By doing so, it seeks to equip students with the skills necessary to navigate complex financial scenarios in their future careers, in the process making Financial Mathematics more accessible and relevant.

Research question

How can a DBR approach be used to enhance overall student understanding of Financial Mathematics at TVET colleges?

This question guided the study's exploration of innovative instructional strategies that are able to leverage error analysis to enhance student comprehension and application of Financial Mathematics, ultimately aiming to improve students' educational outcomes in the TVET context.

Design-based research approach

DBR is a methodology that combines empirical educational research with theory-driven design of learning environments. It resolves complex educational problems through iterative analysis, design, development and implementation cycles, producing practical solutions and theoretical insights (DBR Collective, 2003; Armstrong et al., 2020). This study adopts DBR as its research design, which is discussed further in the methodology section.

Error analysis in education

Research in Mathematics education widely acknowledges that errors are not merely signs of failure but essential components of the learning process. According to Radatz (1979), errors reflect underlying cognitive processes and, when they are systematically analysed, they can

reveal students' conceptual misunderstandings. Borasi (1994) also argues that engaging with errors can promote deeper learning by encouraging reflection and metacognition. This perspective is supported by Hattie and Timperley (2007), who emphasise that feedback, based on error diagnosis, is among the most effective strategies for improving student achievement. More recently, Ekasari and Putra (2023) demonstrated that analysing students' errors provides actionable insights for instructional scaffolding, leading to improved comprehension, particularly in Financial Mathematics. Therefore, error analysis is a diagnostic and instructional tool that enables educators to develop targeted interventions, overcome specific learning difficulties and enhance comprehension.

Naicker (2017) explored the conceptual and procedural difficulties in factorisation among 30 NC(V) Level 4 students and interpreted the findings using the Kilpatrick, Swafford and Findell framework (2001). The study revealed that students made conceptual and procedural errors across all forms of factorisation. This was reflected in their written assessments and emphasises the challenges that students face in order to bridge procedural fluency with conceptual understanding. These studies contribute meaningfully to the broader discourse on error analysis in TVET contexts and build a foundation for improving instruction in general and, in particular, in Financial Mathematics.

Mbeki (2023) extended this line of enquiry by analysing the ways in which NC(V) Level 3 students approached rational algebraic fractions through an ethnomethodological lens.[1] Although the study was not focused on Financial Mathematics, it provided relevant insights into error patterns and reasoning habits in the broader TVET Mathematics context. Mbeki (2023) found that students relied heavily on procedural strategies and often lacked conceptual awareness. This is similar to the challenges observed in Financial Mathematics topics such as interest calculations and budgeting, where students apply formulas without understanding them. These findings underscore the broader challenge in vocational education, that is, bridging the gap between procedural fluency and conceptual mastery across mathematical domains.

Further contributing to the discussion, Motseki and Luneta (2024) used the Newman error hierarchical model to conduct a qualitative case study examining TVET students' responses to optimisation problems. Although the study focused on optimisation rather than Financial Mathematics, the findings are relevant to the broader context of mathematical problem-solving in TVET settings. Their findings revealed that students struggled to apply prerequisite knowledge when solving optimisation problems, probably because of an instructional approach that is heavily reliant on isolated facts and procedures. The study also noted that a cohort of NC(V) Level 4 students consistently made transformation errors – regardless of their chosen problem-solving approach – falling within the broader category of systemic

1 Ethnomethodology is a sociological approach that seeks to understand the social order and rules that structure everyday life through analysing the commonsense methods people use to make sense of, and function in, their daily lives. Rather than studying what 'should' happen, it examines how people construct social reality and the tacit procedures they follow to create and interpret meaning in social interactions. See, also, <https://www.simplypsychology.org/ethnomethodology-definition-examples.html>.

errors. Based on these observations, the authors recommended targeted instructional interventions, emphasising enhanced teaching strategies and continuous formative feedback to overcome persistent misconceptions and to improve conceptual engagement.

Supporting these findings, Ngoveni and Machaba (2024) examined the effectiveness of different questioning techniques in Mathematics instruction at TVET colleges while teaching and learning Financial Mathematics topics. Their study revealed that higher-order questioning strategies significantly enhance students' critical thinking and problem-solving abilities. Together, these studies highlight the importance of responsive teaching approaches that promote deeper understanding, particularly in Financial Mathematics where conceptual reasoning is essential. The importance of systematic error analysis in improving students' mathematical understanding is well documented in the literature. For instance, Laelasari et al. (2019) examined students' errors in solving mathematics problems requiring higher-order thinking skills and found that conceptual and encoding errors were most prevalent; this underscores the value of structured error diagnosis in educational settings. Similarly, Rushton (2018) found that incorporating error analysis activities into mathematics instruction improved conceptual understanding over time. In the context of Financial Mathematics specifically, Ngoveni (2025) applied Newman's error analysis model to identify persistent errors among NC(V) Level 2 students. The study demonstrated how diagnostic feedback, grounded in students' error patterns, could be used to inform instructional adjustments with measurable results.

Collectively, the reviewed literature highlights the critical role of contextually grounded research in shaping effective Financial Mathematics instruction. Several studies explicitly conducted in TVET colleges – such as those by Mbeki (2023), Motseki and Luneta (2024), Ngoveni and Machaba (2024) and Ngoveni (2025) – provide insight into the persistent procedural and conceptual challenges students face across mathematical domains. These studies emphasise the diagnostic power of error analysis, the value of higher-order questioning and the importance of responsive instructional strategies tailored to the needs and challenges that face vocational students. Complemented by broader evidence on error-based feedback and teaching through error analysis (Hattie & Timperley, 2007; Rushton, 2018), this study has established a strong foundation. In response, the current research adopts a DBR approach to overcoming the specific learning difficulties encountered by Financial Mathematics students in order to develop and refine practical, theory-informed interventions in the TVET context.

Theoretical framework

This study was theoretically underpinned by SLT (Lave & Wenger, 1991), which adopts the position that learning is fundamentally tied to authentic social contexts and practical experiences. SLT emphasises that knowledge acquisition is deeply influenced by the context in which it occurs, suggesting that meaningful learning occurs through participation in realistic tasks embedded in students' social and cultural environments (Lave & Wenger, 1991).

Central to SLT are the concepts of legitimate peripheral participation (LPP) and communities of practice (CoPs). LPP suggests that students initially engage in learning tasks from the periphery and progressively move towards more active participation as their competence and understanding deepen (Hanks, 1991; Lave & Wenger, 1991). CoPs are groups in which individuals learn by actively engaging with shared practices, common goals and collaborative interactions. This then leads to the co-construction of knowledge and skills (Wenger, 1998).

In the context of this study, the students at TVET colleges were engaged in authentic Financial Mathematics tasks directly connected to their everyday financial realities. These included drawing up budgets based on actual incomes (allowances, bursaries, part-time employment) and exploring financial scenarios commonly encountered in their communities, including informal savings schemes (stokvels) and informal lending practices (mashonisas) (Van Wyk, 2017; Krige, 2019; Ngoveni, 2025). This alignment directly reflects the tenets of SLT, suggesting that student comprehension improves when learning experiences reflect their lived realities and practical applications (Maharaj, 2013; Khalo et al., 2022).

By situating Financial Mathematics in realistic scenarios, we were able to help the students to transition from perceiving Financial Mathematics as an abstract concept to improving their understanding in ways that enabled them to participate actively in relevant financial practices. Peer collaboration in small-group case analyses further exemplified the CoP concept, where students interacted socially, negotiated meaning collectively and built shared understandings of financial concepts (Jones & Tanner, 2002; Sullivan, 2018).

Therefore, integrating SLT provides a robust theoretical justification of the reasons for and the way in which the pedagogical interventions in this study effectively enhanced the students' comprehension of complex Financial Mathematics concepts. These interventions included, in particular, contextualisation, practical engagement and peer collaboration (Makonye, 2020). This theory explains the improved educational outcomes and reinforces the importance of authentic, socially embedded learning practices in vocational education contexts (Hattie & Timperley, 2007; Hernández-Cortes et al., 2023).

Methodology

This study employed qualitative methods in a DBR approach in order to iteratively develop and refine instructional strategies for teaching Financial Mathematics at TVET colleges. The DBR framework follows a cyclical process of designing, testing and refining educational interventions based on empirical evidence and theoretical insights (DBR Collective, 2003; Armstrong et al., 2020). DBR was selected for its ability to integrate research with systematic instructional design, which allowed interventions to be tested and improved iteratively. Although DBR structured the development and refinement of the intervention, its design was conceptually informed by SLT. This theory supported the integration of real-life financial tasks, enabling students to engage meaningfully with concepts in socially and culturally relevant contexts.

The study involved two independent cohorts of NC(V) Level 2 students enrolled in the Electrical Engineering programme, for which Mathematics is a compulsory subject. This programme consistently registered the highest enrolment of Level 2 NC(V) Mathematics students at the selected TVET college. In 2021, a cohort of 17 students completed a trial examination in Financial Mathematics, which served as the initial implementation of the intervention and is referred to in this article as Prototype I. In 2022, a different cohort of 17 students completed the same examination after refinements had been made, which is referred to as Prototype II. These cohorts were distinct but had similar academic backgrounds, programme structure and course content, ensuring comparability in the students' performance.

The selection of Level 2 students was intentional, as students at this stage solidify fundamental mathematical concepts critical to their progression to higher levels (Kilpatrick et al., 2001). Although the two cohorts were from different academic years, comparability was ensured. Both groups were enrolled in the same NC(V) Level 2 Electrical Engineering programme at the same TVET college, wrote the identical Question 4.1 under the same assessment conditions, and were assessed with the same rubric. These controls allowed performance differences to be reasonably attributed to the intervention rather than to group characteristics.

To ensure the comparability across the two cohorts, the trial examination was set internally, invigilated under strict conditions and moderated. The researcher requested that Question 4 from the 2021 examination be repeated in the 2022 examination, providing a direct basis for comparing the students' performance. The academic schedule guided the focus on Financial Mathematics, ensuring that the data collection aligned with the syllabus timing in both years.

The trial examination included five sub-questions under Question 4.1. These required the students to define key financial terms: variance, stokvels, mashonisa, fixed deposits and budget, which are described below. Each sub-question carried two marks, totalling 10 marks for the question overall. The same questions were used in both years to ensure methodological rigour and reliable comparisons (Nguyen, 2023). These five terms are described below:

- Variance is the difference between the budgeted or expected amount and the actual amount spent or received. It is commonly used in budgeting and financial planning to assess either overspending or underspending (Gitman et al., 2011).
- A stokvel is a community-based, informal savings scheme in which members contribute a fixed amount regularly and take turns in receiving lump-sum payouts; it is commonly employed in South African communities (Van Wyk, 2017).
- A mashonisa is an informal moneylender who operates outside the formal banking sector, typically offering short-term loans at high interest rates to individuals with limited access to traditional credit (Krige, 2019).
- A fixed deposit refers to a bank account where money is deposited at a fixed interest

rate for a set period, offering a secure investment option with limited accessibility until maturity.

- A budget is a financial plan that outlines expected income and expenses over a specific period and is used to manage resources and guide financial decisions (Gitman et al., 2011).

Error analysis was the primary method used to examine the students' responses and identify common misconceptions and learning difficulties. In 2021, students struggled with concepts such as variance and fixed deposits while demonstrating a better understanding of stokvels and mashonisa (Radatz, 1979). Based on these findings, the intervention was refined to correct misconceptions through practical activities and contextual learning experiences (Jones & Tanner, 2002; Sullivan, 2018).

In 2022, the same trial examination was administered and error analysis revealed notable improvements in the students' understanding of the five concepts. For example, the number of students correctly defining variance increased from two in 2021 to seven in 2022, reflecting the effectiveness of real-life contextual learning strategies such as creating personal budgets (Borasi, 1994; Jones & Tanner, 2002; Santagata, 2005).

The study adhered to consistent examination questions and marking procedures to ensure that the data across both cohorts remained reliable and comparable. Using actual student scripts provided authentic data for analysis, strengthening the validity of the findings (Hattie & Timperley, 2007).

Ethical clearance was obtained from the Ethics Committee of the South African university at which the study was conducted, ensuring compliance with research ethics. The confidentiality and anonymity of the student data were maintained throughout the study. To protect the participants' confidentiality and anonymity, pseudonyms were used throughout the reporting process; all the data, including students' scripts and responses were securely stored in password-protected digital folders accessible only to the researchers. Informed consent was obtained from all of the participants, ensuring their awareness of the study's purpose and role (Lincoln et al., 1985). These ethical considerations upheld the integrity of the research process.

Findings

This section examines students' responses to Financial Mathematics tasks, highlighting common misconceptions and error patterns. It also explores the effects of the instructional intervention by comparing student performance before and after its implementation.

The following is a presentation of Question 4.1 from the examination paper administered in both 2021 and 2022.

TABLE 1: Question 4.1 in the 2021 and 2022 examinations

Question 4.1: Define the following terms	Mark allocation
4.1.1 Variance	(2)
4.1.2 Stokvels	(2)
4.1.3 Mashonisa	(2)
4.1.4 Fixed deposits	(2)
4.1.5 Budget	(2)

Source: Authors' analysis

Analysis of definitions of financial concepts

The objective of each sub-question was to define the five financial concepts.

Error analysis of academic year 2021
Seventeen students took the test in 2021 and the total of all the marks that they scored was 68 out of a possible 170 marks, which is 40% of the possible score. Although this percentage exceeds the minimum requirement of 30% to pass this subject, it is relatively low given that three concepts (stokvels, mashonisa and budget) are presumably frequently encountered in the students' daily lives.

Considering that most students are likely to possess a certain level of familiarity with the concept 'fixed deposit', it can be anticipated that even a student who is not adequately prepared would find it relatively easier to define this concept. In contrast, it was anticipated that the concept 'variance' would prove difficult for a number of students, as it is not a term that is familiar to most students. Each of the 17 student scripts was assigned a numerical value ranging from 1 to 17, and each of the scripts was numbered according to the student's script number and the year of the test, for example 1/2021. Similarly, in 2022, the students' scripts were numbered from 1 to 17 and identified by their number and the year of the test, for example 1/2022.

Question 4.1.1 Variance
Among the 17 students, notable difficulty was experienced in understanding the concept of 'variance', as only two students achieved satisfactory results.

- Nine students did not attempt to define this concept. Below is an example of someone who made no attempt to answer:
  Student: 5/2021: 4.1.1

- Examples of the incorrect answers provided in the seven attempted answers:
  Student: 4/2021: 4.1.1 Variance = interest calculated through a certain percentage.
  Student: 7/2021: 4.1.1 Variance = the number of people in a group.

Question 4.1.2 Stokvels

The students demonstrated some understanding of stokvels, with 11 students achieving a maximum score, one student earning a single mark, and five students receiving a zero score.

Noteworthy responses were provided by students 1/2021, 2/2021 and 6/2021, as indicated below.

- A student provided an intriguing perspective by connecting stokvels with women:
  Student 1/2021: 4.1.2 Stokvels is the money that women are paying per month.
- Students used their prior knowledge, such as budgeting for food expenses:
  Student: 2/2021: 4.1.2 Stokvels – a group of people saving money for grocery or some other things.
  Student: 6/2021: 4.1.2 Money that you save as a group and you share at the end of the year.

Question 4.1.3 Mashonisa

Most of the students had no difficulty defining the concept of mashonisa, with 11 of them achieving full marks.

- Two students scored one because they forgot that the money borrowed from a mashonisa should be repaid with interest:
  Student 1/2021: 4.1.3 Mashonisa is the people is lending money.
- Some students provided intriguing responses, demonstrating their familiarity with the concept and ability to connect their answers to their community contexts:
  Student 4/2021: 4.1.3 Mashonisa – a person that borrow people money and they return it extra. Like when borrowing R100 you bring extra with R50, then it's R150.
- The remaining four students demonstrated partial comprehension of the concept yet struggled to express it properly. For example, one student stated that 'mashonisa' refers to a specific sum of money rather than an individual:
  Student 12/2021: 4.1.3 Mashonisa is a person who owe people money.
  Student 17/2021: 4.1.3 Mashonisa is an amount that you borrow … come back with an interest.

Question 4.1.4 Fixed deposits

The term 'fixed deposit' is commonly used and students may have encountered it at some point in their daily lives. However, only four students were able to achieve marks on this question. Of these four, two scored two marks each, while the other two students managed to score only one mark each.

- The concept of fixed deposits was frequently misconstrued, as evidenced by this response:
  Student 3/2021: 4.1.4 An amount of money that you pay every month such as rent.
- Four students defined a fixed deposit as a sum of money regularly deposited monthly, for example:
  Student 5/2021: 4.1.4 Money that is deposited every month into your bank account.
- One student defined this concept as the regular deposit of money into a fixed account, resulting in the gradual growth of the account balance due to the accrual of interest. However, this description was awarded one mark, which is appropriate because it refers explicitly to a monthly deposit rather than a single lump-sum deposit:
  Student 6/2021: 4.1.4 Money that you save in your fixed account and it is increase every month.
- The student who achieved a maximum score on this question provided a straightforward explanation of this concept:
  Student 14/2021: 4.1.4 Fixed deposits – money put in the account and cannot be withdrawn without notice.

Question 4.1.5 Budget

The concept of 'budget' was not clearly defined as anticipated, as only five students achieved a maximum score, while three received only one mark. Nine students failed to define this concept accurately, while three out of these nine did not even attempt an answer. Several students were confused about the concept of keeping a monthly budget and setting funds aside to purchase a specific item. The students did not perceive saving money as an element of the budgeting process but rather as the budget itself.

- Students 10/2021 and 17/2021 provide evidence for this claim:
  Student 10/2021: 4.1.5 Budget – is the money that you invest in your bank account of from other savings received.
  Student 17/2021: 4.1.5 Budget – is an amount that you budgeted for something … keep it safe.
- This misconception is also visible in a student's statement that a budget refers to the money saved after receiving payment:
  Student 13/2021: 4.1.5 Budget – money that is saved after getting paid.

Student learning outcomes and conceptual improvements

The intervention aimed, through an initial error analysis, to enhance students' understanding of Financial Mathematics at a TVET college and to overcome the difficulties identified. In 2021, students were taught Financial Mathematics, including the five concepts discussed, which allowed the researchers to reflect on their teaching practices and incorporate error analysis into their lessons. The initial analysis revealed significant challenges with abstract

concepts such as variance and fixed deposits, while the students were more familiar with everyday terms such as stokvels and mashonisa. This reflection and analysis guided the design of an intervention that integrated targeted teaching strategies into everyday teaching and learning activities, focusing on error analysis and real-life examples to improve conceptual understanding.

Using a DBR approach, we iteratively developed and refined our teaching strategies and materials, implemented initial prototypes during regular classroom sessions and collected performance data to inform continuous improvements.

In 2022, we made significant changes to the approach. Instead of providing students with hypothetical income and expenses to create a budget, we allowed them to use their actual income, whether from allowances or bursaries, as reflected in the example in Table 2 below. This hands-on task helped the students to gain a better understanding of budgeting, as it was directly relevant to their financial situations. The error analysis from 2021 showed that the students often misunderstood a budget as money set aside rather than a process involving planning and saving. By using their real incomes, the students could view and understand budgeting as a practical, comprehensive process.

TABLE 2: Example of student's budget

INCOME		**EXPENDITURE**		
Source	**Amount R'**	**Date**	**Item**	**Amount R'**
NSFAS/bursary	1 025	06/07	Bus ticket	275
Social grant	480	06/07	Clothes (lay-bye)	460
		07/07	Cosmetics	300
		08/07	Creche	300
		08/07	Takeaway	62
Total	1 505			1 397
			Variance	108

Source: Student

Personalised feedback and support were provided through individual feedback sessions, enabling the students to overcome their unique challenges. Formative assessments, including individual and group activities and reflection sessions, were conducted to monitor their progress, while pre- and post-tests measured their overall improvement. The success of the interventions was ensured through iterative refinement based on assessment results and stakeholder feedback, ultimately enhancing the students' proficiency in Financial Mathematics and their ability to apply these concepts in both academic and real-world contexts.

Error analysis of definition questions 2022

An error analysis was conducted in 2021 to evaluate the effectiveness of Prototype I and determine whether any revisions were necessary. Moreover, a thorough error analysis was considered indispensable for Prototype II. The analysis served a twofold purpose on this occasion. First, it provided a basis for the initial assessment of Prototype II to determine whether Prototype III should be implemented or if Prototype II is sufficient. Second, the analysis results were employed in the summative assessment, specifically in comparing the two prototypes to measure the impact of the revised model.

Question 4.1.1 Variance

In 2021, the students did not respond well to Question 4.1.1, which required them to explain the concept of variance, with only two students achieving a full score. Nevertheless, there was a significant improvement in 2022, as seven students attained a full score and only three did not attempt to answer the question. Among the five definition questions, this particular question showed the most significant improvement in performance between 2021 and 2022: a significant increase of 11 marks in the total score was evident, making it the most improved question.

- Most of the students' responses demonstrated a higher level of understanding than in the previous year. The achievement can be credited to implementing the intervention outlined in the preceding paragraphs. This is one student definition: Student 16/2022: 4.1.1 Variance – a difference between a budget amount and actual amount.

Question 4.1.2 Stokvels

This question required students to define the term 'stokvel'. It received the second-highest score when adding students' marks on this question, earning a total of 28 marks. The number of students who achieved a perfect score rose from 11 in 2021 to 14 in 2022, resulting in a five-point increase.

The improvement in performance can be ascribed to the students' ability to demonstrate a strong comprehension of the concept. Nevertheless, while engaging in discussions, certain students encountered difficulties in expressing their comprehension in writing. This compelled the researchers to guide them to express themselves more clearly. The approach focused on highlighting the importance of presenting the concept in a manner that assumes the reader has no prior understanding of the concept and explaining it in a way that is

easily understandable. It is probable that this guidance improved the students' performance, not only on this question but also in their answers to other questions. It is crucial to emphasise the importance of relating learning activities to students' real-life experiences, as this promotes a more profound comprehension and improves academic performance. These are two student definitions:

> Student 10/2022: 4.1.2 is the group of people that have agreement of certain money to invest at the end they share it.
> Student 12/2022: 4.1.2 Stokvels – money that a group of people that contribute monthly and give one the amount until they get it all.

Question 4.1.3 Mashonisa

Students were asked to define the term 'mashonisa'. In 2022, 15 students obtained a perfect score on this question. One student scored one point, while the remaining student did not attempt the question. In this question, the students obtained the highest total score of 30 marks out of a possible 170. In 2022, four more students achieved full marks for this question in comparison with the previous results of 2021. The students' performance in this question was commendable, indicating their overall involvement in class discussions regarding this concept.

According to the reports from 2021, the majority of the students defined a mashonisa as an individual who provides loans without explicitly disclosing the associated interest rates. In contrast, a significant proportion of students in 2022 incorporated interest into their explanations, suggesting an enhanced comprehension of the concept or a more effective means of articulating it. The students' enhanced capacity to articulate the concept can be ascribed to the guidance they were offered – similar to that for the previous questions – instructing them to define a concept using their own words. This methodology improved the students' comprehension and expression of the concept, leading to a notable improvement in their overall academic achievement. Here are two definitions of mashonisa:

> Student 6/2022: 4.1.3 Mashonisa is the person who give people a certain amount and need it with interest.
> Student 10/2022: 4.1.3 is the person that borrow other's money with the high amount of interest when you return it.

Question 4.1.4 Fixed deposits

The students were tasked with defining the concept of fixed deposit in this question. Out of the total number of students, ten achieved full marks, while three chose not to answer the question. This led to a six-point increase in the overall performance compared with the previous year. The class generally exhibited a commendable comprehension of the concept compared with the previous group in 2021. The 2022 cohort successfully avoided the confusion between the concept of a fixed deposit and that of fixed costs, which posed a difficulty for the 2021 cohort. One student defined the term as follows:

> Student 2/2022: 4.1.4 Fixed deposits – Money invested in a bank for a specific period at a fixed rate of interest.

This enhancement implies that the instructional and learning methodologies employed in the classroom successfully enhanced the overall understanding of the concept, resulting in a greater number of students being able to engage actively with the material and apply it during the examination. Some students could not attain any marks in this question, yet they exhibited a certain degree of comprehension of the concept:

> Student 16/2022: Fixed deposit – is the fund that when you wanna buy something the … you have to make some deposits first.

> Student 4/2022: Fixed deposit – an exert money deposited.

Question 4.1.5 Budget

In this question, the students were required to explain the concept of a budget. In general, the students demonstrated strong performance, as 13 students achieved full marks and only two did not attempt the question. The question achieved the third-highest ranking in Question 4.1 of the test, falling behind mashonisa and stokvel in performance.

As previously mentioned in the discussion on variance, incorporating the students' real-life experiences was essential to enhancing their comprehension of the concept. In 2021, the students encountered difficulties in accurately explaining the notion of a budget, as most mistakenly defined it as solely pertaining to a predetermined sum of money set aside or invested for a particular objective. However, following their participation in an activity involving the creation of personal budgets using their bursaries or allowances and considering monthly expenses, the students acquired an improved comprehension of, and perspective on, the concept. This approach probably played a role in the substantial enhancement of the students' performance in the 2022 examination. Here is one of the best definitions of the concept:

> Student 9/2022: Budget statements which you write all your things that you are going to need with that money and write it down in order to know how much you are going to spend on each thing that you need to buy.

As per the marker's assessment, student 6/2022 failed to answer this question accurately, although they displayed a partial grasp of the budget concept. The student's difficulty seems to have been expressing their response with clarity. The marker could have assigned the student one mark because the student had mentioned using money after getting paid:

> Student 6/2022: Budget is the amount of money that you use after getting your income.

Comparison between the two years

The bar chart in Figure 1 visually represents the number of students who obtained maximum scores in 2021 and 2022 for each financial concept. The data clearly illustrate student performance improvement across all concepts after the intervention.

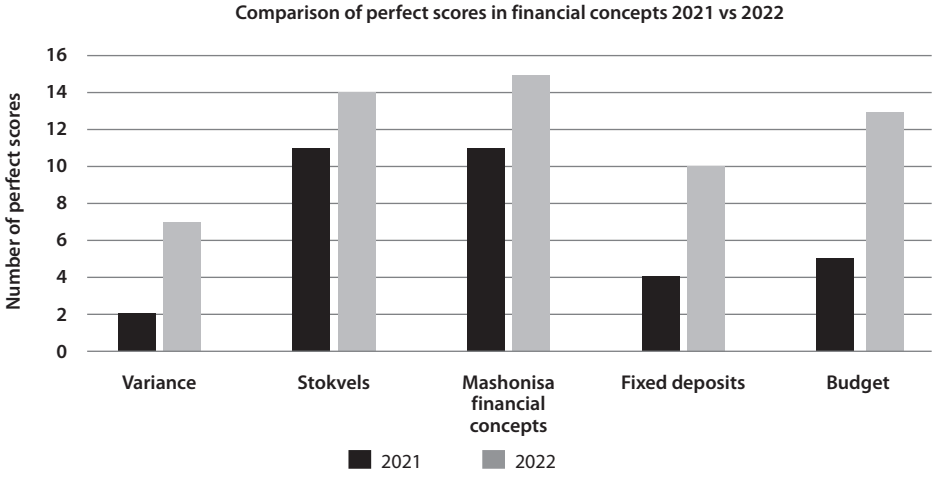

FIGURE 1: Bar graph comparing the number of students who achieved full marks per question in 2021 and 2022

Source: Authors' own

This comparison of the 2021 and 2022 results reveals some interesting and significant findings:

- *Variance*: The number of students achieving maximum scores increased from 2 in 2021 to 7 in 2022.
- *Stokvels*: There was an increase from 11 maximum scores in 2021 to 14 in 2022.
- *Mashonisa*: The maximum scores rose from 11 in 2021 to 15 in 2022.
- *Fixed deposits*: The number of students achieving maximum scores increased from 4 in 2021 to 10 in 2022.
- *Budget*: The maximum scores increased from 5 in 2021 to 13 in 2022.

These improvements highlight the effectiveness of the intervention strategies implemented, particularly contextualised learning, personalised feedback and iterative refinement of teaching methods within a DBR framework.

Discussion of findings

This discussion integrates the study's findings with the DBR approach, error analysis, SLT and relevant literature to provide a comprehensive understanding of the study's impact on improving student performance in Financial Mathematics at TVET colleges.

Role of design-based research

The study employed a DBR approach characterised by iterative design, implementation, analysis and redesign cycles. This iterative process enabled the continuous refinement of teaching strategies based on the students' performance. The significant improvement in their performance between 2021 and 2022 highlights the effectiveness of this approach. As Collins et al. (2004) highlighted, DBR is particularly valuable in developing and testing educational interventions in real-world settings, because it ensures that the solutions are practical and grounded in classroom experiences. The iterative cycles in DBR, as noted by Shavelson et al. (2003), enhance educational practices by making them theoretically sound and practically applicable.

In the implementation of the prototypes, Prototype I in 2021 identified that the students experienced considerable challenges with abstract financial concepts, which led to the development of targeted teaching strategies in Prototype II. The focus on real-life applications and personalised feedback in Prototype II improved the students' performance in 2022. This aligns with the study of Armstrong et al. (2020), who stress the importance of iterative refinement and practical applicability in educational research. These refinements were intentionally aligned with SLT, ensuring that instructional strategies were socially and contextually meaningful.

Error analysis

Error analysis played a crucial role in identifying specific areas of student difficulty, such as misconceptions about some terms: for example, 'variance' and 'fixed deposits'. Black and Wiliam (1998) have emphasised the importance of formative assessments in diagnosing and resolving student misunderstandings. The clear identification of these misconceptions guided the development of targeted interventions. Both Radatz (1979) and Santagata (2005) also underscore the value of error analysis in diagnosing and correcting misconceptions.

In the present study, targeted interventions were then designed to overcome these misconceptions, incorporating hands-on activities such as personal budgeting to render abstract concepts more relatable and comprehensible. This approach is consistent with that of Ngoveni and Mofolo-Mbokane (2019), who demonstrated that overcoming fundamental misconceptions through targeted interventions significantly improves student understanding. The marked improvement in the students' ability to define terms such as 'variance' between 2021 and 2022 demonstrates the efficacy of this targeted approach.

This diagnostic process was enhanced by SLT's emphasis on understanding the students in their own social and cultural environments, which made more authentic identification of their misconceptions possible.

Enhancing comprehension through contextual learning

The literature supports the implementation of contextualised learning and real-life applications in enhancing student understanding. Maharaj (2013) emphasises that practical and applied learning experiences are crucial to deepening students' comprehension. The present study's findings that students understood financial terms such as 'stokvels' and 'mashonisa' better when these are contextualised in their community experiences align with Makonye's (2020) argument that learning is more effective when it is relevant to a student's cultural and social context.

This study also drew on Dewey's (1938) concept of experiential learning, where students learn through doing. By engaging in practical applications of financial concepts, students could move beyond theoretical definitions to understand the functional aspects of financial management. Lave and Wenger (1991) support this approach, arguing that learning is a situated activity that occurs through participation in social practices. These findings are reinforced by SLT, which adopts the position that, when students engage with problems which mirror their everyday experiences, they are more likely to construct meaningful understanding.

This personalised guidance functioned in the social interactions characteristic of SLT's CoPs, which encouraged the students to refine their understanding through peer and instructor collaboration. Personalised feedback and formative assessment, which are central to the study's intervention, are well supported by Black and Wiliam (1998), who emphasise the importance of formative assessment in identifying and resolving students' misunderstandings. The iterative refinement of teaching strategies contributed significantly to the improvements observed in the students' understanding and performance, which is consistent with the findings of Hattie and Timperley (2007).

Financial Mathematics in TVET colleges

Financial Mathematics is a crucial discipline for TVET college students, because it equips them with the essential skills for making informed financial decisions. However, the study revealed that traditional teaching methods often fail to overcome the abstract nature of Financial Mathematics, leading to significant challenges in student understanding. As Jones and Tanner (2002) and Nguyen (2023) have noted, these methods typically rely on rote memorisation and procedural learning, which do not necessarily promote deep understanding or critical thinking.

The study's integration of error analysis within the DBR framework and innovative teaching methods that foster critical-thinking and problem-solving skills resolved these challenges effectively. Higher-order questioning techniques, as advocated by Ngoveni and Machaba (2024), also enhanced the students' understanding of complex mathematical concepts.

The significant improvement in the students' ability to define the identical financial terms between 2021 and 2022 highlights the effectiveness of this intervention. Hiebert and Grouws (2007) emphasise the importance of connected and coherent instruction to deepen students' understanding; this study's findings support that principle. The improvements suggest a deeper comprehension of financial concepts, moving beyond rote memorisation to meaningful application. The evidence of improved performance illustrates not just pedagogical success, but also the students' deeper integration into real-life financial practices, as framed by SLT.

Recommendations

To enhance students' understanding of Financial Mathematics it is essential to integrate contextualised learning experiences that relate mathematical concepts to real-world applications. This approach helps students to connect theoretical knowledge with practical scenarios, making abstract concepts more tangible and relevant. As demonstrated in the intervention, activities such as creating personal budgets using actual income should be incorporated into the curriculum.

Educational institutions should adopt DBR methodologies to refine and improve teaching strategies continuously. The iterative process of DBR allows for the development of practical solutions that are responsive to students' needs. Regular design, implementation, analysis and redesign cycles should resolve specific learning challenges and enhance educational practices.

Limitations of the study

The study was conducted with two small, independent cohorts of 17 students each (2021 and 2022), which limits the generalisability of the findings. While the results provide valuable insights, a larger sample size would be needed to confirm the effectiveness of the intervention across a more diverse group of students.

The study was conducted in a single TVET college, which may limit the applicability of the findings to other educational contexts. Differences in institutional resources, teaching practices and student demographics could influence the effectiveness of the intervention.

The study focused on a limited number of financial concepts (variance, stokvels, mashonisa, fixed deposits and budget). While these concepts are important, the study's findings may not fully capture the challenges inherent in other Financial Mathematics topics or the learning needs of those students studying Financial Mathematics.

Conclusion

The 2021 and 2022 examination results analysis, supported by a well-designed intervention, highlights the importance of DBR, error analysis and contextualised learning to improving students' understanding of abstract concepts in Financial Mathematics. The iterative cycles of design and refinement in this study ensured that the teaching strategies were practical and effective. The error analysis provided valuable insights into student misconceptions and served to guide targeted interventions. The literature on experiential learning and formative assessment supports the findings, emphasising the need for teaching strategies that bridge the gap between academic content and students' lived experiences. This approach is essential to enhancing the relevance and effectiveness of education in TVET colleges and beyond. Grounding the intervention in SLT allowed for a meaningful connection to be made between mathematical content and students' lived financial experiences, which suggests the importance of socially contextualised teaching practices in vocational mathematics education.

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Violence against queer students: Experiences of black lesbian students at a technical and vocational education and training college

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ABSTRACT

There is an apparent dearth of research on the experiences of black lesbian students in technical and vocational education and training (TVET) colleges, especially regarding their academic success and social interactions. This study therefore aimed to bridge the knowledge gap by examining the experiences of six black lesbian students at a TVET college in the province of KwaZulu-Natal, South Africa. By pursuing a decolonial feminist perspective, the research focused on the legacy of colonial and apartheid effects in a TVET college. This qualitative study elicited data through narrative interviewing and photovoice techniques. Data analysis combined both visual narrative analysis and analysis of the narratives. The participants reported that they experienced sexual, emotional, physical and verbal violence while studying at the TVET college. It is recommended that the government integrate intentional and consistent interventions into higher education spaces in order to support the psychological, emotional and social well-being of lesbian, gay, bisexual, transgender, queer and other sexual orientations and gender identities (LGBTQ+) in students.

KEYWORDS

Violence; black lesbian students; decolonial feminism; heterosexism; technical and vocational education and training (TVET) college

Introduction and background

Violence defined

Violence comprises attributes such as physical, psychological and sexual viciousness (United Nations Children's Fund (UNICEF), 2019):

- Physical violence can be in the form of physical attacks, verbal abuse, emotional abuse, social exclusion, physical fights and destroying property.
- Psychological violence includes verbal abuse, emotional abuse and social exclusion.
- Sexual violence may be in the form of unwanted sexual touching, sexual comments and jokes, sexual harassment, coercion, and bullying and rape, including attempted rape.

Types of violence inflicted on lesbian, gay, bisexual, transgender and queer students in post-school education and training institutions

In general, studies conducted in tertiary institutions in South Africa have found that LGBTQ+ students experience various forms of violence based on their sexual orientation (Van Vollenhoven & Els, 2013; Mavhandu-Mudzusi et al., 2017; Naidu & Mutambara, 2017; Kosciw et al., 2020). These acts include being assaulted and stripped naked, being stabbed and being raped. In addition, McBride (2020) adds stalking, name-calling, teasing, mocking, slander, damage to property, threatening behaviour and sustained bullying as lived experiences of LGBTQ+ students in post-school education institutions. Furthermore, homophobic acts such as invisibilisation (i.e. hiding from view, airbrushing out of existence), rejection and intolerance of sharing a public space with sexual minorities have been discussed by gender scholars (Bhana, 2012; Kiekel, 2012; Jagessar & Msibi, 2015). Because these acts caused students to be reluctant to attend classes and to fear for their safety in the higher education environment, they consequently dropped out of their courses (Mavhandu-Mudzusi & Sandy, 2015). Similarly, rejection and social exclusion – for example, being ignored by classmates and educators – were also reported as being reasons for the termination of their studies (Msibi, 2011; Van Vollenhoven & Els, 2013). Moreover, Matthyse (2017) noted that public spaces were coded to be heterosexual; therefore, gender non-conforming students were alienated from facilities such as recreational establishments and cloakroom facilities.

Lamentably, some research studies have revealed the prevalence of hate crimes such as students' property being stolen or deliberately damaged, persecution and threats to murder them (Kiguwa & Langa, 2017; Prado-Castro & Graham, 2017). Derogatory labelling (Jagessar & Msibi, 2015), macro-aggressions (Kiekel, 2012), 'corrective' rape and even the murder of lesbian women (Nela et al., 2017), are incidents that have been described by gender scholars. Understandably, Mkhize et al. (2010) judge South Africa as a misogynist society that uses tradition and culture to justify prejudice and the need for power to control vulnerable groups.

Global context

Globally, LGBTQ+ people continually face extensive stigmatisation and maltreatment. In some countries, the penalty for same-sex relationships is prison or even death (Hutt, 2018). For example, in a study of homophobic bullying among LGBTQ+ university students in Nigeria, the findings revealed evidence of severe homophobic bullying coupled with non-existent protective educational policies for lesbian, gay, bisexual and transgender students (Okanlawon, 2017). Moreover, Thoreson (2016) recorded that some students from the LGBTQ+ community at educational institutions in the United States were being shoved into lockers, pushed or checked by heterosexual students to determine whether or not they had breasts. In addition, in 2016, Walsh explored the challenges faced by black lesbians living in North Central Florida, where it was revealed that heterosexism and homophobia[1] were experienced by LGBTQ+ students; this was aggravated by social isolation and loneliness. Furthermore, malicious gossip was reported to tarnish the status of LGBTQ+ students. This form of social maligning can be psychologically debilitating to students, as it creates feelings of loneliness, depression and anxiety which lead to such students' withdrawal from social and academic engagement. Other negative experiences that were reported in the study included 'intimidation, rejection, marginalisation and bullying to acts of violence and sexual assault' (Walsh, 2016:1237).

Disturbingly, global electronic or cyberbullying has been reported as being rife. The Gay, Lesbian and Straight Education Network (GLSEN) in the United States reported that 32% of LGBTQ+ students are absent from school for at least one day a month because they feel unsafe or uncomfortable (Kosciw et al., 2012). The GLSEN organisation also reported that LGBTQ+ students experience electronic or cyberbullying, which raises questions about their safety and feeling less welcome in higher education; hence, many drop out of college (Kosciw et al., 2020). In addition, a study conducted in Ireland found that 'students experienced name-calling, teasing and bullying in their everyday lives' (Minton et al., 2008:177). Finally, a Spanish study revealed that 'violence against LGBT people is especially silenced in higher education' (Rios et al., 2023:2685).

Policy context in South Africa

Policies and Acts for transformation in post-school education

Soon after the demise of apartheid in 1994, several laws and policies were introduced to transform the historically unequal and inequitable post-school education and training system. These Acts specifically included 'sexual orientation' as a concern in post-school educational institutions (Constitution of the Republic of South Africa, 1996). The transformation agenda stipulated in the legislative framework held the promise of equity for disadvantaged students, including LGBTQ+ students in post-apartheid South Africa (Maringe & Osman, 2016).

1 Heterosexism is discrimination on the basis of sexual orientation practised by heterosexuals; homophobia is an intense fear or hatred of homosexual people or homosexuality.

The Constitution of the Republic of South Africa has an equality clause in the Bill of Rights that protects the rights of lesbians. In section 9(3) of the Constitution, in particular, it is stipulated that the state may not unfairly discriminate against anyone on the grounds of sexual orientation, which means that the private life and sexual activities of all people should be respected.

In addition, section 13 of the Promotion of Equality and Prevention of Unfair Discrimination Act 4 of 2000 (PEPUDA) stipulates that discrimination based on sex and gender is considered unfair. Section 8 of PEPUDA outlaws gender-based violence (as a form of homophobia), the systemic inequality of participation and the lack of access to education by homosexuals because of their sexual orientation. The Act further outlaws the unequal structures, hierarchies and power relationships that plague our society. Section 3, which is the most applicable to this study, also promulgates the principles of the National Education Policy to achieve equitable education opportunities and the redress of past inequalities in the provision of education. This includes the promotion of gender equality and the advancement of the status of women.

In addition, the White Paper for Post-School Education and Training (Department of Higher Education and Training (DHET), 2013) is a vital policy document that highlights key principles to be adopted in the TVET system by 2030. Its intention is to transform institutional cultures of exclusion by redressing inequity. It sets out a vision for a 'post-school system that can assist in building a fair, equitable, non-racial, non-sexist and democratic South Africa' and which enables 'expanded access, improved quality and increased diversity of provision' (DHET, 2013:4). However, research in the education sector reveals that, despite promises of equality, inclusion and non-discrimination being entrenched in legislation and policies, many educational institutions continue to repeat patterns of heterosexism (Reygan & Francis, 2015; De Wet, 2017). For instance, non-normative sexualities are labelled as the 'deviant other' for not conforming to the heterosexual culture of these educational institutions.

In addition, in 2016, the policy framework for realising social inclusion in the post-school education and training system was introduced by the Ministry of Higher Education and Training. Its main aim was to deal with the exclusion of access and to enable the participation of black women from marginalised backgrounds in institutions of higher learning. This policy acknowledged the horrific incidence of homophobic violence at educational institutions and therefore advocated the transformation of cultures at these educational institutions (DHET, 2013). Despite this policy, human rights violations against LGBTQ+ students frequently occur in post-school education and training institutions, which indicates continuing social intolerance and disrespect for the law (De Wet, 2017).

Literature review

Researchers note that not much has been done to respond to continuing heterosexist patterns, homophobia and gender-based violence in post-school education in South Africa (Rolfe & Peters, 2014; Naidu & Mutambara, 2017). Despite a watertight legislative framework being in place in South Africa, black lesbian students are still subjected to gross discrimination, including

marginalisation and invisibilisation (Akala & Divala, 2016; Matthyse, 2017; Mavhandu-Mudzusi et al., 2017). Many studies in South Africa report that discrimination still exists, despite the increasing acceptance and participation of sexual minorities (Msibi, 2013; Munyuki & Vincent, 2018; Nela et al., 2017; Bhana, 2012). According to Munyuki and Vincent (2018), the focus of transformative processes in higher education in South Africa has been to redress the historical injustices linked to race and class, with little attention being paid to sexuality and heterosexism. This study therefore sought to investigate violence levelled against black lesbian TVET college students. This was also considered necessary because most studies have focused on universities (Leschet al., 2017; Prado-Castro & Graham, 2017), with only a few studies having focused on TVET colleges (Ngidi & Dlamini, 2017). The limited research on LGBTQ+ students' experiences of violence in the TVET college sector (Rolfe & Peters, 2014) was also a key factor that motivated the writing of this article.

African perspectives on homosexuality

Traditional, cultural and religious beliefs hold that same-sex relationships are unacceptable – a notion held by segments of the population in South Africa and also around the world (Lesch et al., 2017; Prado-Castro & Graham, 2017). Studies have exposed the challenges faced by LGBTQ+ communities, challenges that are created and sustained by the cultural beliefs in certain societies. In many of the traditional South African cultures, manhood is culturally defined in terms of dominance, toughness, masculine behaviour and the defence of male privilege – all of which promote an ideology of patriarchy and male superiority (Mkhize et al., 2010). Many scholars have linked violence against black lesbian students to advancing the patriarchal order (Msibi, 2013). Msibi (2013) adds that homophobia is directly linked to patriarchal systems which believe that women's bodies belong to men. This entrenched cultural and societal norm contributes to higher rates of violence against lesbians, as violence is seen as a tool to be used by men to exert their authority over women (Jagessar & Msibi, 2015). In South Africa, some view homosexuality as a colonially imported idea and hold discriminatory beliefs and prejudices towards all homosexuals (Nela et al., 2017). However, same-sex attraction has indigenous origins and is not exclusively a Western import; homosexuality is accordingly not a product of Western influence but rather a natural aspect of human diversity that predates colonialism (Msibi, 2011). Koraan (2015:1935) defines heteronormativity as 'the institutions, structures of understanding, and practical orientations that make heterosexuality not only seem coherent – that is organised as a sexuality – but also privileged'.

Conceptual framework

Decolonial feminism aims to create a plurality of knowledge where all cultures are regarded as being equal and, as a result, all people have the right to be unique. And although individuals will differ, it avers, everyone is nevertheless equal. The decolonial feminist theory challenges masculine Western epistemologies that dominate African culture and ways of life; in this way, these epistemologies encourage heterosexism and the silencing of the voices of indigenous women to become agents in the production of knowledge from the perspective of gendered differences.

Moreover, South African tertiary education institutions continue to uphold gender binaries that were established during the colonial and apartheid eras (Breshears & Beer, 2016). It is argued that the prevailing gender norms that emphasise heterosexuality enable homophobic bullying and harassment to be performed (Mogotsi et al., 2017).

Fortunately, decolonial feminism (Oyèwùmí, 1997; Lugones, 2010) encourages indigenous women to confront and disrupt oppressive, normative gender binaries and, in so doing, contribute to social change. This study also sought to encourage the participants to identify and reflect on their experiences of violence by engaging in critical dialogue to identify any opportunities, tools and strategies for social change. By exploring the experiences of black lesbian students through these conceptual lenses, the researcher was able to comprehensively understand the social, cultural, historical and political time and place that reflect the contextual features of their lived experiences.

Methodology

The study employed a feminist paradigm to facilitate the process of participants telling their stories. A qualitative research approach was adopted which elicited incisive information about a range of experiences articulated by a small sample of six students (Patton, 2002). A visual narrative enquiry methodology was adopted so that the students' stories could describe their experiences in detail. The participants were selected through a purposeful homogenous sampling procedure, which led to a diverse sample that was representative of the lesbian population in post-school education and training institutions. To identify the participants, snowball sampling was used. Moreover, the data-collection methods, which included narrative interviewing and photovoice, assisted in generating real-life narratives from the participants in the form of verbatim accounts.

Ethical clearance was obtained from the Humanities and Social Sciences Research Ethics Committee of the University of KwaZulu-Natal to proceed with the study. Confidentiality was maintained by using pseudonyms rather than the participants' real names. Permission was sought from the participants to use their photovoice images and the cropping of photo images was used to anonymise them. Care has been taken to ensure that the descriptions are offered in ways that will not enable the participants to be identified. A brief synopsis of the information on each individual's experiences of violence is given below.

Synopsis of the experiences of violence

Nosipho's story:

> My name is Nosipho and I am a 19-year-old student in the NCV programme (Education and Development). I like drinking in taverns during weekends. I was seen by some college guys courting other ladies at the tavern. They warned me against doing that, but l did not listen to them. One day, l was walking home with

my girlfriend from college when they followed us and stripped us naked and proceeded to burn our clothes. We went to report the matter to the police, but they teased, mocked and laughed at us and said that the perpetrators should have hit us harder. My classmates mock and tease me when I am walking with my girlfriend. I think it is because I get all the nice girls. They also call me a 'drama queen'.

Nandi's story:

My name is Nandi. I did not pass at school and enrolled in the NCV (Engineering and Related Design) programme at the TVET college, specialising in Fitting and Turning.

I am sexually attracted to other women. I see myself as ('umjita') a guy. Well, I was once attacked by some guys at the campus. They followed me inside the toilet. They pinned me down and took off my pants and molested me. They told me to stop dating other girls and come and date them instead. I do not tolerate being harassed and discriminated against. (Frowning) I get very angry and cut myself with a razor blade.

FIGURE 1: My razor-blade scars (Nandi)

Neli's story:

My name is Neli and I am a 19-year-old black bisexual Zulu student who is registered for the National Certificate (Vocational), specialising in Engineering Fabrication. I'm bisexual – I have feelings for both males and females. My college boyfriend noticed that I also date other girls. He then started abusing me: he was hitting me and locking me in the house to keep me away from my girlfriend. He even raped me and I fell pregnant. He would say he is trying to correct my

behaviour of loving another woman. He burnt my clothes and books. He said he will tell people that I am bisexual and social workers will take my child away because of my promiscuous behaviour. I would even spend days without food and locked up in the room.

Noxolo's story:

My name is Noxolo and I'm currently studying at college, doing my second year in Engineering Fitting. I was attacked by a mob of male students from the college with sticks and stones. They claimed that I was taking their girls. One of them said that his girlfriend had dumped him because of me. They said they were going to show me what real guys do. They hit me badly and started stripping off my clothes in an attempt to rape me. A taxi stopped by and the driver pulled a gun and promised to shoot them if they continued with what they were doing. They ran off, leaving me naked and shaken. I never reported the incident to the police or college campus management. I was convinced that no one was going to believe me. I do not feel respected as an LGBT student on campus. Students around the campus have a mindset that is very judgemental towards me. They pass unnecessary comments that are directed towards me. They call me a loser, attention-seeker and drama queen.

Nompilo's story:

My name is Nompilo and I am studying Automotive Repair & Maintenance at the college. It was during lunchtime that some male students asked to talk to me privately. We went to a secluded corner. One of the guys pulled a knife and threatened to cut my throat if I ever date any of their girls on campus. I reported them to a male lecturer, but he did not take the story seriously. The same male students once followed my girlfriend while she was walking home alone. They tried to court her and she refused. They asked her to take off her underwear and show them her male private parts if she had them. At college, l like kissing and cuddling other ladies. As a result, I often experience criticism for my behaviour. I am disliked by my peers, who use a derogatory label when referring to me as 'sis boy'. They tell tales about my sexuality and say l have both female and male sexual organs.

Nomsa's story:

I am Nomsa and I am 20 years old. I came to this college to study Motor Mechanics. I am strong and like fixing cars. I am a black female butch and I have never dated men before. On experiences of harassment, discrimination, and violence, I have only experienced name-calling. Physically, they can't touch me. I fight like a bull; most guys fear me. I told them that I will stab them if they dare

> to come near me. However, I make sure that I am home early because they can kill me at night. I have only had threats that they will catch me one day but I haven't had anything so far.

Data analysis

The narrative analysis approach was used to dissect the collected data, while a visual narrative analysis method was adopted as a broad approach that included both words and images (Butina, 2015). This was executed by repetitively reading the transcriptions of the data. The key text was highlighted while in-text comments assisted with grouping issues and experiences which were common among the participants, and this led to the formation of three themes. The codes that were initially generated were reduced during a second coding cycle to identify the major categories of analysis that would be useful in reporting the findings. In their narratives, the participants spoke about their experiences regarding violence committed by other students while they were at the TVET college.

The following experiences of violence impeded their participation and success at the college:

TABLE 1: A summary of the participants' experiences of violence

PARTICIPANT	FORM OF VIOLENCE
Nosipho	Physical and psychological abuse
Noxolo	Physical and psychological abuse
Neli	Physical and sexual abuse
Nandi	Physical, psychological and sexual abuse
Nomsa	Psychological abuse
Nompilo	Sexual and psychological abuse by male students

Source: Author's analysis

According to Table 1, four participants experienced physical violence, five experienced psychological violence and two experienced sexual violence. These negative experiences impeded their social and educational access and success at the college.

Findings and discussion

This section presents and discusses the findings generated from the narratives of the participants. The participants' responses were organised according to three broad themes, physical, sexual and psychological violence, which were aligned with the research question in the following heading:

What factors impede black lesbian students' participation and success at a technical and vocational education and training college?

The factors that impeded the participants' participation and success included physical, sexual and psychological violence. These negative responses resulted from name-calling, bullying, derogatory labelling, verbal abuse, mockery, molestation and rape by heterosexists. This resulted in a lack of social acceptance and reduced access to an education. These incidents occurred in lecture rooms, on the way to and from college, and in toilets or cloakrooms. Such negative and often violent experiences affected these students' physical and psychological health, leading to absenteeism and failure in their examinations.

The following quotations illustrate these experiences:

> Some of my classmates often say that they don't want anything to do with 'izitabane' or homosexuals. They sometimes even try to give me artificial hair (bonding), hoping that I will look like a proper girl. I feel unwanted by what they say. They don't want to choose me during group work. [Nosipho]

> Some guys from college hit me and even tried to rape me to prove to me that I am not a man. [Nandi]

> They giggle behind my back or whisper in each other's ears and laugh, and I feel it in my bones that it has to do with my sexual orientation. Others say I am just an attention-seeker. [Nandi]

> The atmosphere at this college is hostile to us lesbians. Most guys feel uncomfortable around us. They follow us, make fun of us and bully us. Nothing is being done to them. [Neli]

> One of the guys pulled a knife and threatened to cut my throat if I ever date any of their girls on campus. I reported them to a male lecturer, but he did not take the story seriously. [Noxolo]

> They mock me and say hurtful things about me. They call me a loser. At some point, I lost confidence in myself and even doubted my intellectual capabilities. I was often absent from college and failed most of my modules. I tried killing myself twice, since I felt like a loser. [Nompilo]

> I don't want to be social with heterosexuals on campus, since they make jokes and ask silly questions about my sexual orientation. [Nomsa]

Physical and sexual violence

Gender-based violence and 'corrective' rape

Gender-based violence (GBV) refers to any harmful act that is executed explicitly against another person's will and which is based on socially ascribed gender (McBride, 2020). It includes acts that inflict physical, mental, emotional or sexual harm, such as 'corrective' rape or suffering that includes deprivations of liberty or freedom of movement – for example, stalking. Other forms of GBV may include name-calling, teasing and mocking, slander, damage to property, threatening behaviour and sustained bullying (McBride, 2020).

Neli experienced GBV. During the photovoice workshop, she displayed a photo and described how her boyfriend had hit her and raped her to 'correct' her sexual orientation, and he had also locked her in a room to keep her away from her girlfriend. 'Corrective' rape entails the abuse of any member of a sexual minority to 'correct' them towards a heterosexual orientation (Bhana, 2012). Scholars have reported a rise in the incidence of cases of 'corrective' rape taking place in South Africa, where lesbians are raped, the perpetrator holding the distorted view that such rape could convert the lesbian victim to heterosexuality (Nela et al., 2017). She described the room she was incarcerated in as 'my little prison' (see Figure 2).

FIGURE 2: 'My little prison' (Neli)

Homophobic violence

Nosipho experienced homophobic violence, as male students stripped her naked and proceeded to burn her clothes. Moreover, she was teased, mocked and laughed at even more by these perpetrators at the college. Moreover, the police defended the perpetrators' actions by implying that they should have 'hit her harder' for her 'crime of courting other women'. The above incident is a form of GBV referred to as homophobia, which is a specific form of violence and, consequently, an act of gender oppression (Francis, 2017). Homophobia is described as the fear, hatred or intolerance of sharing a public space with sexual minorities. Heterosexuality is considered to be the only natural practice of sexuality that is acceptable and any non-conformity with heteronormativity is viewed as deviant, unnatural and perverse (Bhana, 2012).

Psychological violence

Rejection

Nosipho also experienced rejection by her classmates because of her sexual orientation, as they openly expressed that they did not want anything to do with 'izitabane', which is a derogatory Zulu term for homosexuals. Homosexual individuals are rejected by homophobic individuals as being outside the heteronormative schema of sexual orientation (Francis, 2017). Homophobic individuals experience dislike of, distaste for or even fear of same-sex sexual partnerships. Such hostility towards LGBTQ+ youths, based on peer victimisation and rejection, increases the likelihood of their experiencing emotional and psychological distress and suicidal ideation (McBride, 2020).

Sexual violence

Hate crimes

Nandi was subjected to hate crimes by some black males on campus. She was molested and attacked in a toilet at the college, as they saw her as a theat. None of these violations were reported to the police or to the college authorities. She felt that she 'had no voice to tell the tale' and she also feared being judged by others. In South Africa, Breen and Nel (2011:34) define a hate crime as 'an act that constitutes a criminal offence and is motivated in part or whole by bias or hate'. Sometimes, the victim's actual or perceived sexual orientation may be an influencing factor in such crimes. Hate crimes may lead to social isolation, which may result in withdrawal from social and academic engagement.

Sexual harassment, stalking, coercion and unwanted sexual touching

Noxolo experienced disapproval from her heterosexual peers for holding hands and kissing her girlfriend during the recesses. In addition to the disapproval that was openly displayed by the other students, she was not invited to religious gatherings such as prayers at the college. Moreover, Noxolo was threatened with a bread knife by some black male students, who

accused her of taking their girlfriends away from them. After this incident, these students began to stalk her. They followed her while she was walking home from college on a secluded road. They tried to talk her into going out with them but she refused. They forced her to take off her underwear to see whether she was anatomically male.

Stalking includes deprivations of liberty or freedom of movement (McBride, 2020). Such criminal assaults make LGBTQ+ students feel unsafe in educational institutions, and this ongoing sense of insecurity interferes with their ability to succeed in their studies (Jaklitsch, 2017). This may even result in the termination of their education or training because of their anxiety about their safety in the higher education environment.

Psychological and sexual violence

Name-calling, bullying, mocking and sexual harassment

Nompilo was mocked by her classmates, who often passed unnecessary and hurtful comments about her lifestyle as a lesbian. She also experienced name-calling: she was called a 'loser', an 'attention-seeker' and a 'drama queen'. The mocking and name-calling she experienced from her peers made her dislike going to the college and studying. She was often absent from college and failed most of her modules. She tried to kill herself twice, convinced by the negative comments that she truly was a 'loser'. In class, she experienced bullying. Her classmates did not like working with her in group work. She was also molested by some black male students in the college toilet. These male students felt between her legs to check whether she was male or female, thus criminally violating her human right to privacy. They also pulled off her bra to check if she had breasts. Similarly, a study conducted by Van Vollenhoven and Els (2013) recorded students being assaulted and stripped naked, stabbed and raped because of their sexual orientation.

Hostile attitudes and name-calling

In this study, hostile attitudes by heterosexual individuals and especially by black male students formed barriers to social access and also to meaningful participation and success in the TVET environment for black lesbian students. Nomsa experienced hostile attitudes for kissing and cuddling other women. Peers called her derogatory terms such as 'sissy boy' and ostracised her. She always made sure that she was home early after college lectures because of the threats that some black male students had made to her, indicating that they were going to rape and kill her. In the same vein, in a study conducted by Mavhandu-Mudzusi and Sandy (2015), the threat of rape led many students to conceal their sexual identity, not to attend specific classes, to terminate their studies and even to attempt suicide. Nomsa also experienced name-calling, bullying, derogatory labelling and verbal abuse, which resulted in her lack of attendance at college. South African researchers found that hostile attitudes hindered effective participation at tertiary education institutions and academic success among sexual minorities because of the oppression and discrimination they had to experience (Jagessar & Msibi, 2015).

Environmental barriers as a risk of physical and sexual violence

The findings also reveal that environmental barriers were experienced by black lesbian students. Some students felt that they should be allowed to use the male toilets because they identify as being masculine. However, they believed that this practice could expose them to further discrimination in the form of their not being accepted, and that they would be at risk of being targeted for assault and rape.

Psychosocial impact of violence on LGBTQ+ students

Various forms of violence – for example, physical 'corrective' rape and verbal abuse, including hate speech and labelling in homophobic academic learning environments – violate individuals' rights (Msibi, 2013; Rothmann, 2018). The findings in this study also reveal that negative experiences resulting from physical, sexual and psychological violence, based on an individual's sexual orientation, can result in LGBTQ+ students' experiencing chronic emotional distress, heightened feelings of insecurity at the institution, academic underperformance, the abuse of substances and an increase in the symptoms associated with depression.

'Decolonial turn' to end violence

This conceptual framework centred on decolonial feminism regarding the interpretation of sexuality and gender, since it challenges coloniality, modernity and the patriarchy of Western, gendered systems (Oyèwùmí, 1997; Lugones, 2010). This approach facilitated an epistemic break from colonial Eurocentric knowledge which led to the rewriting, exclusion and domination of indigenous ways of knowing (Oyèwùmí, 1997; Lugones, 2010). As a result, gender theorists have proposed a 'decolonial turn' as a solution to delink from Western knowledge and relink with indigenous ways of knowing to end violence in tertiary institutions.

Recommendations

As a result of this study, the author regards it as necessary to make the following recommendations:

- The government should implement intentional and consistent interventions in higher education spaces to support the psychological, emotional and social well-being of LGBTQ+ students, such as the black African lesbian students who formed the present cohort.
- TVET colleges should develop clear and inclusive policies for admitting and supporting lesbian students.
- Perpetrators who violate the rights of LGBTQ+ students should be severely sanctioned and appropriate consequences should ensue.

- TVET colleges should fund programmes involving LGBTQ+ coordinators to lead awareness programmes to deal with the stigma and discrimination against LGBTQ+ individuals on all their campuses.
- LGBTQ+ students should be encouraged to seek assistance from supportive college staff members.
- College counsellors should be appointed to focus on working with LGBTQ+ students and their families to assist in embracing the principles of individuality and respect for difference, thereby encouraging transparency and societal inclusivity.
- Importantly, new college buildings should always include three to five individual toilets (such as those provided for differently abled individuals or for families at shopping malls) as an alternative for individuals who feel uncomfortable entering the main cloakrooms for personal reasons.

Limitations of the study

Although this study contributes to the literature that deals with violence in tertiary education colleges, it is characterised by some limitations. Because sexuality is a sensitive subject to discuss, it is important to recognise that the pre-established relationships among the participants and the researcher may have affected the participants' level of comfort to discuss their lesbian identities. This could have influenced the findings. As I was their lecturer, they may not have felt that they could disclose sensitive and personal information to me which could have benefited the study. In fact, they may have felt pressurised to tell me what they thought l wanted to hear, possibly fearing that I would victimise them or besmirch their characters to other lecturers.

These power issues were taken into consideration at the beginning of the data-collection stage, when I assured the cohort that I would maintain the utmost confidentiality, which I did throughout the study. As the sample size was small, consisting of six black lesbian students, the findings cannot be generalised to encompass the social and academic experiences of all black South African lesbian students at TVET colleges. The study was also limited to black African lesbian students at an urban TVET college, although some of the students came from rural areas. This could compromise the transferability of the study's findings to urban settings.

Conclusion

The present study explored the participants' experiences from a feminist standpoint which recognises the structural and cultural forces that can constrain women's access to education. The data revealed that these young black lesbians were confronted with a wide range of challenges, including gender-based violence, sexism and discrimination. Patriarchal cultural traditions are still used to discriminate against women instead of protecting them. Although, as enshrined in the Bill of Rights, the Constitution of the Republic of South Africa (1996) prohibits discrimination based on sex and gender and protects the equal rights of individuals, this group of students nevertheless remain exposed to discrimination and victimisation.

The themes that emerged from the participants' narratives also indicate that Western and colonial influences and structures, forced upon us during the oppressive apartheid era, entrench patriarchy and exacerbate the inequalities between heterosexual individuals and black lesbians in South Africa, unlike the ideologies of decolonial feminism. This practice of discriminating against and using GBV against LGBTQ+ community members requires urgent intervention by all role players, lest we become a country known to turn a blind eye to communities who are different.

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The role of social media and artificial intelligence tools in engaging hearing-impaired students in vocational education: A Zimbabwean case study

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ABSTRACT

The rapid advancement of social media and artificial intelligence (AI) has significantly influenced the participation of hearing-impaired (HI) students in vocational education in Zimbabwe. This study explored the ways in which social media platforms and AI-powered tools affect these students' access to vocational eduacation opportunities and also their social, emotional and economic well-being. The study aimed to answer the following two research questions: How do social media and AI tools facilitate vocational education for HI students in Zimbabwe? What are the opportunities and challenges associated with the use of social media and AI tools in vocational education for these students? The research focused on Hunhu Vocational School in Harare. Data were collected through a case study approach involving 12 purposively selected HI students, using semi-structured interviews, and in-depth interviews with three teachers and one key informant. Thematic analysis was employed to identify patterns and emerging themes in the data. The findings indicate that, in the Zimbabwean context, social media and AI tools hold emancipatory potential for HI vocational students by expanding educational access and opportunities to include them. However, the study also highlights the persistent structural, institutional and personal barriers that hinder the effective use of these technologies in vocational education.

KEYWORDS

Artificial intelligence (AI) tools; hearing-impaired (HI) students; social media; vocational education; Zimbabwe

Introduction

The role of social media and artificial intelligence (AI) tools in enhancing vocational education for hearing-impaired (HI) students in Zimbabwe is becoming increasingly significant (Mutswiri & Hapanyengwi, 2025). However, there remains a paucity of research specifically focused on the application of social media and AI in vocational education in the Zimbabwean context. Vocational education is broadly defined as the preparation of learners with practical skills for employment and self-employment. It is often regarded as the preferred educational pathway for individuals with hearing impairments, as it provides tangible opportunities for self-reliance and economic participation (Muwaniki & Muvirimi, 2017).

Globally, an estimated 466 million people experience hearing loss, making it one of the most prevalent forms of disability (Terry & Meara, 2024). According to the 2022 Census, people with disabilities comprise approximately 9.2% of Zimbabwe's population. While comprehensive data on students with hearing impairments in Zimbabwe are limited (Pedersen et al., 2022), earlier estimates suggest that about 2.5% of students experience hearing loss (Choruma, 2007). As in many other countries, the participation of people with disabilities in education and employment in Zimbabwe lags behind that of the general population (Hlatywayo & Ncube, 2014). The integration of social media and AI tools into the education system is therefore viewed as a promising development that could improve access to education and more successful outcomes for HI students.

The concepts of social media and AI are subject to definitional ambiguities. However, for the purposes of this article, *social media* refers to a range of user-centric digital spaces that enable social interaction and networking online (Obar & Wildman, 2015). In the Zimbabwean context, the most commonly used social media platforms include Facebook, X (formerly Twitter), WhatsApp, TikTok and YouTube. *AI*, in contrast, is defined as a scientific discipline concerned with creating computing models that simulate human cognitive processes for problem-solving (Shehu et al., 2021). A notable application of AI is *machine learning*, a subset of AI that underpins several data-based tools used in daily life which imitate the way humans learn to perform tasks autonomously (Jung, 2022). In this study, we focused on AI tools that leverage machine learning and are specifically applied in vocational education for HI students. These include visual reality sign language laboratories, interactive 3D signing environments, and sign-language avatar models (Kasapakis et al., 2023).

Social media have emerged as key communication tools that exert both positive and negative influences on learning and student engagement (Fazal et al., 2025). The technological revolution has further expanded the educational use of social media, benefiting both students with hearing impairments and their hearing peers (Musengi, et al., 2023). Similarly, AI contributes to the development of sign language by enhancing communication and promoting knowledge acquisition among HI learners (Papastratis et al., 2021).

This article reviews the literature on the intersection of social media and AI broadly, while also paying attention to the unique context of Zimbabwe, where access to technology and resources may differ significantly from that of other regions. The study sought to answer the following research questions:

1. How do social media and AI tools facilitate vocational education for HI students in Zimbabwe?
2. What are the opportunities and challenges associated with the use of social media and AI in vocational education for students with hearing impairments in Zimbabwe?

The article is structured as follows: literature review, methodology, findings and discussion, and conclusion.

Literature review

Globally, AI is permeating more areas of daily life and is increasingly being used in professional contexts such as vocational education (Laupichler et al., 2022). The emergence of the Fourth Industrial Revolution (4IR) has brought the use of AI tools, robotics, the Internet of Things (IoT) and biotechnology to the forefront of education and industry (Schwab, 2024). As these technologies evolve, they require new skills and competencies. The global technological revolution has significant implications for vocational education, leading to various advances that can enhance learning experiences, improve institutional efficiency and prepare students for the workforce. However, challenges are associated with disruptive technologies such as AI, especially when they are applied in weaker economies and also among populations with special needs (Mhlanga, 2023). Goal 4 of the United Nations Sustainable Development Goals (SDGs) emphasises the need to provide inclusive and equitable quality education and promote lifelong learning, including vocational education opportunities, by the year 2030 (Gupta & Vegelin, 2016). Despite this proclamation and the targets set, providing equitable opportunities for underprivileged communities, including students with HI, remains a daunting challenge (Fazal et al., 2025).

The use of AI tools has significant implications in approaches such as pedagogy, andragogy and heutagogy (self-initiated learning). These concepts relate to self-determined learning, which has become increasingly relevant through the use of technology; they enable adaptive education, personalised instruction and real-time transcription services that provide greater accessibility for HI students (Halder & Tayade, 2021). In the context of Zimbabwe, the growing integration of AI tools and social media in vocational education provides unprecedented positive opportunities for HI students. AI technologies have the potential to mitigate communication barriers and enhance access to auditory information, in this way improving the educational experiences of this target group (Chandramma et al., 2025). AI is making advances daily, introducing new and exciting technologies that are significantly changing society; these could be used by HI students engaged in vocational education.

AI has the potential to improve the quality of life of these students by overcoming communication challenges and expanding their access to auditory information (Alkahtani, 2024). The fusion of social media and AI tools in the context of vocational education serves to facilitate more inclusive educational frameworks for HI students. Social media platforms act as dynamic environments for resource sharing and community building that enable HI students to engage with educational materials which resonate with their unique experiences. Through online platforms such as WhatsApp and Facebook, HI students can connect, share knowledge and collaborate on educational projects because these platforms foster a more supportive and participatory learning atmosphere (Charitoo et al., 2023). In addition, AI applications, including machine learning-based tools for speech recognition and computer vision, are able to transcribe and translate sign language in real-time, which promotes active engagement among HI learners (Hari et al., 2025).

Moreover, research indicates that the personalisation of educational content through AI-driven adaptive learning platforms allows students to learn at their own pace and according to their own style. This significantly enhances their overall learning outcomes (Lee et al., 2022). Furthermore, the provision of assistive technologies such as AI-powered tools that offer real-time captioning further equips HI students to navigate educational materials effectively (Scherer et al., 2023). This targeted approach not only fosters improved comprehension but also promotes a culture of self-directed learning, which is essential for empowering HI learners in Zimbabwe's educational landscape. More specifically in vocational education, social media platforms such as YouTube, Facebook and Twitter have been used to improve the learners' thinking, technical and collaboration skills (Mafrur & Andri, 2018).

The literature on the opportunities and challenges in the use of social media and AI in vocational education in the Zimbabwean context is still scarce because the area of study is still in its nascent stage of development. However, the few studies conducted to date indicate that the integration of emerging technologies, including Internet-based social media and AI, faces substantial challenges (Mutswiri & Hapanyengwi, 2025). According to Mutswiri and Hapanyengwi (2025), the economic status of Zimbabwe as an emerging economy that has experienced over four decades of economic crisis has had an impact on growth in many sectors, including technological development. The major challenges are structural – such as the technological divide, the human-capital skills gap and financial investment barriers (Chilunjika & Chilunjika, 2024; Mutswiri & Hapanyengwi, 2025). Fundamentally, teachers lack the necessary skills with which to facilitate learning using modern technologies such as social media and AI tools. This implies that, without the proper professional development of vocational teachers in the use of social media and AI tools in learning, the integration of these technologies will remain a challenge. Yet AI-assistive devices can provide personal help and support to HI students in their completion of learning tasks and activities (Salawa et al., 2024). The transformative potential of AI-based tools for HI students is duly acknowledged, though, according to Mukabbir (2023), AI-supported devices provide innovative tools that enhance communication, accessibility and student engagement.

Methodology

The study was conducted at the Hunhu Vocational School (a pseudonym) in Harare, Zimbabwe. This school was selected because of its inclusive approach to secondary education, its strong emphasis on vocational training and its population of a significant number of students with hearing impairments. The data collection for this qualitative case study involved 12 purposively sampled primary participants – HI vocational students – and, in addition, three vocational teachers from the Hunhu Vocational School and one representative from the National Association of Societies for the Care of the Handicapped (NASCOH). Semi-structured interviews were conducted with the primary participants to gain insights into their experiences, challenges and opportunities regarding the integration of social media and AI tools in vocational education (Mears, 2012). The researchers observed the ethical considerations of obtaining informed consent from the teachers of students and from the student participants, in line with the requirements for research involving children (Jenkin et al., 2020). The student participants in the study were exclusively drawn from a secondary school that offers general academic and vocational subjects. Their ages range between 14 and 21 years and they were enrolled in Forms 2, 3 and 4. For several reasons, it is not unusual to have young adults still in secondary school, including disability (D'Angelo & Singal, 2024). Interviews with the HI students were conducted using sign language by a qualified sign language interpreter who was part of the research team; this greatly facilitated effective communication.

In-depth interviews were also conducted with the three vocational teachers and the NASCOH Programmes Officer. The qualitative approach that was used enabled a flexible interview process, allowing the participants to share their experiences freely while ensuring that key topics were systematically covered. The diversity of the participants, in alignment with the principle of triangulation, enabled us to obtain a comprehensive understanding of both the lived experiences of HI students and the institutional frameworks that influence their access to vocational education in Zimbabwe (Santos et al., 2020). Thematic analysis, as described by Clarke and Braun (2017), was used to analyse the data and identify recurring themes and patterns.

About the case: Hunhu Vocational School

Hunhu Vocational School is a church-based institution that is dedicated to empowering children with hearing impairments at both the primary and the secondary education levels. The school was initially established as a residential institution for learners with hearing impairments, which reflects the common trend among schools for students with disabilities in Zimbabwe (Musengi, 2014). In its early years, the school catered exclusively for students with hearing impairments. However, with the advent of inclusive education policies, the school began to enrol students without disabilities, embracing a more integrated educational model.

Hunhu Vocational School offers both academic and vocational programmes. Academic subjects are examined by the Zimbabwe School Examinations Council (ZIMSEC), whereas

vocational subjects are assessed by the Higher Education Examination Council (HEXCO) at the National Foundation Certificate level, which is the focus of this study. The school currently has 142 students enrolled, of whom only 11 do not have hearing impairments – demonstrating the institution's continuing commitment to inclusive education.

The vocational department offers a variety of practical subjects, including carpentry and joinery, bookkeeping, bakery studies, computers, and garment construction and textiles. These programmes are designed to equip students with the appropriate skills for employment and self-sufficiency, and they are aligned with the broader goals of vocational education for learners with a disability.

Presentation and discussion of findings

This section presents and discusses the study's findings under the following subheadings:

1. The interface of social media and AI tools in vocational education;
2. The opportunities provided by social media and AI tools for HI students in vocational education; and
3. The challenges associated with their use.

The study has possible limitations, because, as it is a case study, the findings may not be generalisable to all vocational schools with HI students across Zimbabwe. However, the results are able to provide valuable insights into the ways in which social media and AI tools can be used in vocational education settings and into the challenges that are faced in their use. Consequently, the study has relevance to other institutions and provides lessons that might inform their approaches.

Interface of social media and artificial intelligence tools in vocational education

The integration of social media and AI into vocational education for HI students in Zimbabwe is becoming increasingly critical to promoting inclusive educational practices. The convergence of these technologies provides a dynamic platform through which HI students can actively engage in learning, access educational resources and interact meaningfully with their peers and educators.

Teacher 1 highlighted this convergence, stating:

> Social media serves as a dynamic space in which information is readily shared, enabling HI individuals to access resources and communities that resonate with their experiences. For example, at Hunhu Vocational School, HI students use AI applications to enhance their learning experiences.

Student 3 echoed the transformative impact, noting:

> My learning experiences have changed since the introduction of social media and AI in teaching and learning. The use of social media has improved communication with other students, both with and without hearing impairments. This has increased my sense of belonging to the academic community.

Another student, Student 11, shared their experience:

> Social media and AI tools help me to remain in touch with current trends in various areas. Through the use of these technological tools, I stay updated on developments in the world. Information comes directly to my gadget as long as I have data.

Student 12 remarked further:

> Social media and AI tools work hand in hand. I am not sure which informs the other, but it appears AI is now available on all social media platforms.

From these insights, it is evident that there is a growing convergence between social media and AI tools. AI is increasingly being embedded in the social media platforms used by the students and teachers at Hunhu Vocational School, which enables real-time communication, improved access to information and enhanced engagement. These tools play a vital role in bridging communication gaps and facilitating learning among HI students. The findings align with previous research, which highlights the potential of AI-powered tools to enhance communication and to make information more accessible to students with hearing impairments. Technologies such as computer vision and speech recognition allow for the transcription and translation of sign language, and in these ways they support real-time interactions and the consumption of educational content (Musengi et al., 2023).

Opportunities for using social media and artificial intelligence tools among hearing-impaired students in vocational education in Zimbabwe

Social media and AI tools offer numerous opportunities for HI students in vocational education by fostering greater accessibility, engagement and independent learning. These tools support the development of inclusive educational environments by bridging communication gaps and enabling personalised, self-paced learning experiences.

One of the most promising applications is the use of virtual reality (VR) technologies, including the visual reality sign-language laboratory, interactive 3D signing environments and sign-language avatar models. These tools simulate real-world scenarios and help HI students to understand speech patterns through lip-reading and visual cues. Sign-language avatar models also translate spoken and written communication into sign language and enable inclusive engagement (Mondonico, 2021).

Communication-enhancement tools such as the *SignBridge System*, which allows for real-time captioning in multiple languages, speech-to-sign translation, gesture recognition and visual learning aids contribute further to a more accessible educational environment. Social media and AI have therefore emerged as powerful platforms that support vocational education among persons with a disability. They not only enhance communication and access to resources but also encourage collaborative and self-directed learning in virtual communities.

Student 8 stated:

> AI tools and social media have opened a lot of possibilities because I can now access tutorials. Social media platforms, through AI, can now use sign language – something that has never been used before. I can learn at my own pace and share notes in real-time with my colleagues; hence, learning is now more engaging and fun.

Student 6 added:

> Social media and AI have become an essential part of my educational journey. Platforms like YouTube and Facebook offer valuable resources, including sign-language tutorials and captioned videos. The fact that these learning platforms are not controlled by our teachers means I still have access to materials after lessons. This gives me more control over my learning.

Teacher 1 highlighted the collaborative use of social media in vocational instruction:

> Social media platforms are a very important tool in the teaching of vocational subjects. For example, in a WhatsApp group, we post assignments for learners. We can hold group discussions, mark and post written work, and evaluate each learner's performance and participation in real-time.

Teacher 2 emphasised the broader impact of these tools:

> As an instructor for HI students, I believe social media and AI tools play a pivotal role in providing accessible learning resources [and] networking, and increasing their chances of gaining employment and livelihood opportunities.

Teacher 3 noted the practicality and flexibility that these tools provide:

> These tools enhance inclusivity, especially in learning vocational skills. Since time for practicals is often limited in class, students use platforms like YouTube in their free time to complete their tasks.

In addition, Teacher 1 described the implementation of advanced AI tools at the school:

> Since 2023, we [have been using] Sign Teach Pro, a custom-developed software [program] that translates Zimbabwe Sign Language in real-time and provides instant feedback on sign-language practice. The software has an accuracy rate of 85% for local sign-language recognition. We also use an AI-powered chatbot for basic query responses, voice-to-text translation, and integration with local sign language.

These experiences align with broader research that highlights AI's transformative potential in education. AI also enables personalised learning through intelligent tutoring systems and automated assessments (Papastratis et al., 2021). Adaptive learning platforms tailor educational content to individual needs and learning styles, enhance comprehension and foster self-directed learning (Mohebbi, 2025). In addition, AI-powered applications support real-time captioning and translation, which helps HI students to engage more effectively with educational materials (Alkahtani, 2024).

Massive Open Online Courses (MOOCs) are another example of the way AI and online platforms can make high-quality education accessible to diverse learners, eliminating geographical and financial barriers.

Key Informant 1 from NASCOH observed:

> In our organisation focused on disability, we see AI and social media as opportunities to advocate for the rights of students with disabilities. Platforms like WhatsApp, Facebook, and Twitter are used to mobilise support and share information on issues like HIV and AIDS, sexual and reproductive health rights (SRHR) and, more recently, drug and substance abuse. These are critical issues for vocational learners because they do not live in a vacuum.

These insights underscore the broader educational and social value of integrating social media and AI tools into vocational education. Their use fosters collaborative learning, self-directed learning and heutagogy. Platforms such as WhatsApp and YouTube enable students to participate in virtual-learning communities, exchange knowledge and collaborate on projects. Through machine-learning algorithms, AI tools can analyse learning patterns to offer personalised content that enhances comprehension and motivation.

Moreover, AI can help educators to develop targeted strategies that support HI vocational students, not only in acquiring technical skills but also in dealing with critical life skills. This is particularly relevant in the Zimbabwean context, where challenges such as drug abuse and HIV and AIDS are prevalent (Mugari, 2024). Instructors can use data-driven insights to adapt teaching methods to meet diverse learning needs and to ensure inclusive success. This

is particularly important in resource-constrained settings where traditional methods may fail to accommodate all learners. Furthermore, the time limitations of classroom-based practical sessions in vocational education reinforce the value of online platforms that allow students to continue learning beyond the school environment.

Challenges of using social media and artificial intelligence tools in vocational education for hearing-impaired students in Zimbabwe

The study revealed that the integration of social media and AI tools in vocational education for HI students faces barriers that affect the use of these modern technologies in the Zimbabwean vocational learning context. Both students and teachers have expressed their views on, and their experience of, the barriers they have been up against in attempting to use these tools.

Student 7 noted two main challenges for them:

> The challenges that I face are mainly to do with … data, which is very expensive, and I can hardly afford to have data that lasts me for just a week. The other challenge is that they [the tools] are not easily accessible. I have also often been bullied and called names on social media. I am sometimes even scared to associate with fellow students in vocational education because of that.

Teacher 3 stated that the major shortcomings are these:

> I acknowledge the shortcomings of AI tools and social media. The major issue is … limited digital literacy among HI students. Some social media lack accessibility features, thereby limiting them from benefiting from such platforms. The challenge also extends to us, the teachers. We lack up-to-date knowledge and skills to fully utilise social media and AI tools in the classroom.

Another teacher added to these limitations:

> A large percentage of our students come from rural areas where there is no or limited access to the Internet. Some also face language barriers, for example some do not understand English; hence, they would not benefit without the assistance of a translator.

The above was also confirmed by Key Informant 1, who noted:

> The use of AI tools is much easier for people who can see and hear but poses great challenges for a person who lacks both senses – the deaf–blind. I haven't come across AI [tools] that work well with this category of learners.

Furthermore, another student (Student 7) made this point:

> In Zimbabwe, the cost of data is beyond our reach most of the time. Due to the high costs, we lose out on learning experiences. The high costs of access also extend to Internet-enabled gadgets such as smartphones, tablets and laptops.

Key Informant 1 added the following points:

> Though vocational teachers have a variety of social media and AI tools at their disposal, these have not yet been fully integrated as learning platforms. The elephant in the room is the attitude of some teachers who think that social media is just for fun and not educational. Another challenge linked to the above is the lack of capacity on the side of teachers to effectively use social media and AI tools in the learning environment.

The above data reveal that there are real challenges in the use of social media and AI in vocational education, certainly as evidenced at this institution. The main challenges identified are cost, access, a negative attitude among teachers towards the use of technology in teaching and learning, and their lack of competence in the use of technology. From the data presented, the digital divide remains a critical issue for Zimbabwe. Access to reliable Internet and technology is not uniform; this is particularly the case in rural areas, where there may be a lack of infrastructure to support the effective use of social media and AI. This disparity could exacerbate existing inequalities and leave some HI students at a greater disadvantage than before (Moyo, 2022; Vurayai, 2023). Another critical issue is that access to social media and AI tools by HI students is never equal; there is therefore a genuine fear among scholars that their use will possibly exacerbate the digital divide (Mhlanga, 2023). In addition, instructors may lack knowledge about the appropriate technological tools to use when instructing HI students, which could lead to the ineffective use of technology. Moreover, educational curricula may not fully integrate the technology that supports inclusive learning environments for HI students.

Strategies to enhance the use of social media and artificial intelligence in vocational education for hearing-impaired students in Zimbabwe

Based on the findings of the study, we recommend the following strategies to enhance the provision of social media and AI tools in vocational education settings in Zimbabwe. We argue that students need to gain increased access to technology gadgets, vocational teachers need training and capacity development, and locally adaptable social media and AI tools need to be developed to reduce the digital divide.

Increase access to technological gadgets

Educational institutions can, however, establish dedicated computer laboratories, create mobile technology-lending programmes for HI students and develop offline-capable learning

applications for areas with limited connectivity. The ethical and responsible use of social media and AI have become topical issues that also need to be considered when such media are used in vocational education settings (Mhlanga, 2023).

Training and capacity development of vocational teachers

Vocational education teachers need training in the use of AI tools and social media if teaching and learning through these media are to be implemented effectively. Such training will enable them to offer personalised guidance and support to HI learners, answer questions and provide feedback and encouragement to them, apart from rendering them confident users of the technology themselves. Teacher training and professional development have become a top priority to ensure the effectiveness of digital learning (Muwaniki & Wedekind, 2018) and therefore mandatory training for educators in AI-assisted teaching tools must be implemented.

Create locally adaptable social media and AI tools

Technology developers should be required to develop AI models that are applicable to Zimbabwe sign-language variants and create content delivery systems that are optimised for low-bandwidth environments. They also need to design user interfaces that reflect local cultural contexts.

Promoting digital equity

AI can help to identify students who need additional support early on to enable timely interventions and prevent learning gaps from widening (Aljedaani et al., 2022). However, ethical and digital equity challenges must be overcome and all HI learners must have fair and equitable access to AI technologies, regardless of their backgrounds or circumstances. In addition, efforts should be made to bridge the digital divide and to ensure that all HI students have access to the necessary technology and Internet connectivity to participate in vocational education opportunities.

Conclusion

Based on this study, the researchers conclude that social media and AI tools can, and should, play a pivotal role in transforming the vocational education of HI students in Zimbabwe. Based on the study's findings, several key conclusions emerge.

First, the integration of social media and AI has significant potential to dismantle the traditional barriers to education experienced by HI students. These technologies not only enhance communication but also foster inclusive learning environments that can be personalised to meet individual needs. Features such as real-time translation, captioning services and adaptive-learning platforms have created new opportunities for educational engagement – opportunities that have historically been limited or overlooked in Zimbabwe's vocational education system.

Secondly, while these tools offer significant benefits, several challenges persist and must be resolved. The digital divide, infrastructural constraints and limited accessibility continue to hinder equitable access to social media and AI technologies. These problems are especially pronounced in rural and remote areas, where Internet connectivity and access to digital devices remain limited.

In response to these challenges, the researchers recommend several strategies to strengthen the integration of social media and AI tools into vocational education for HI learners. These include improving access to technological devices, promoting digital equity and investing in the training and capacity-building of vocational teachers to use these tools effectively both in and beyond the classroom.

Looking ahead, the future of AI and social media in Zimbabwean vocational education will depend on the effectiveness of their implementation and the extent to which the current barriers are overcome. Nevertheless, the combined potential of AI-powered personalised learning and the community-building capabilities of social media offers a promising pathway towards improving the educational experiences and outcomes of HI vocational students.

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Exploring the role of artificial intelligence (AI) in recognition of prior learning: Opportunities for transforming adult learning and assessment

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ABSTRACT

Artificial intelligence (AI) is reshaping higher education and potentially the recognition of prior learning (RPL) by enhancing assessment processes, ensuring fairness and expanding access to adult learners. This study explored a new and fairly under-researched area that focuses on AI's role in supporting adult learners, who enter higher education through alternative pathways, by automating the evaluation of portfolios and improving the accuracy of assessments. It also focused on AI's role in supporting personalised learning pathways. It examined key digital approaches, ethical considerations and the challenges of integrating AI-driven tools in the RPL and adult learner context. The study, framed within constructivist learning theory, highlighted AI's potential to tailor learning experiences based on prior knowledge. The constructive alignment of adult learning principles and AI was explored. Reflective thematic analysis was used to identify transformative tools, digital support, student empowerment and academic upskilling as key themes throughout this study. The findings indicate that AI, with ethical safeguards in place, could streamline and enhance RPL processes and render assessments more efficient, transparent and equitable.

KEYWORDS

Artificial intelligence (AI); recognition of prior learning (RPL); adult learning; digital andragogy; higher education; assessment

Introduction

Recent developments with artificial intelligence (AI) in higher education have both significantly and rapidly had an impact on conventional teaching, learning and assessment practices, thus opening numerous channels of engagement with AI-related tools and applications (Popenici & Kerr, 2017). AI-driven technologies, such as natural language processing (NLP), machine learning (ML) and generative AI, are enhancing the personalisation of education by improving the accuracy of assessments and by providing real-time support to students (Soundarya et al., 2025; Vetrivel et al., 2025). Existing scholarship has extensively explored the integration of AI in higher education, focusing on its applications, benefits, challenges and transformative potential (Pedro et al., 2019). The use of AI in higher education institutions (HEIs) across multiple disciplines has evoked an astonishing range of possibilities and opportunities for teaching and learning practices in dentistry (Shan et al., 2021), mathematics (Lee & Yeo, 2022), physics (Chung et al., 2025) and economics (Ruiz-Real et al., 2021). The perspective of this work is based on the synthesis of current research findings to provide a comprehensive understanding of AI's impact on higher education from an adult learning standpoint.

AI applications include adaptive learning systems, automated assessment and feedback, intelligent tutoring systems and predictive analytics (Gupta et al., 2022). AI-driven tools personalise learning experiences by analysing student data to adjust the presentation of content or the mode of delivery, in these ways enhancing a student's engagement and comprehension (Galindo-Domínguez et al., 2024). In an independent study, the causal feedback mechanisms of AI transformation in a typical higher education institution (HEI) setting were mapped using a causal loop diagram (CLD). The findings of that study showed that these systems can identify individual learning styles and provide customised resources to meet diverse student needs (Katsamakas et al., 2024).

In this study, the term 'learning styles' is used not as a predictor of learning outcomes but as a conceptual lens through which to acknowledge the diversity of the ways in which adult learners engage in constructing knowledge in recognition of prior learning (RPL) processes and in their university studies (Knowles, 1978). It is important to note that, here, 'learning styles' refers to the varied orientations and strategies adult learners bring to navigating RPL rather than a strict matching tool for instruction. AI tools have been applied to facilitate efficient grading and feedback mechanisms, particularly in large-scale courses (Mahapatra, 2024). Another research study explored AI applications in various areas of professional and knowledge work. Specific attention was paid to emotions and the role they play in integrating the use of technology in the workplace. The findings indicated that, by automating routine assessment tasks, educators can allocate more time to interactive and personalised teaching activities (Eshraghian et al., 2024). Another interesting application to advance higher education is the use of AI-powered tutors that offer real-time assistance by guiding students through complex problem-solving processes and by adapting to their learning pace (Chan & Tsi, 2023).

Collectively, these systems or applications have been shown to improve student performance and retention rates (Kamalov et al., 2023). In addition, AI can align academic and behavioural data to forecast student outcomes and enable early interventions for those students at risk of underperforming (Krause et al., 2024). This proactive approach supports student success and institutional effectiveness. It is well known that student learning abilities are unique and diverse. Therefore, given the advances of the Fourth and Fifth Industrial Revolutions, it is necessary to have a multi-layered approach that will cater to the diversity and learning needs of students (Lubinga et al., 2023).

AI in higher education also offers students the opportunity for personalisation, as it enables the tailoring of educational experiences to individual student needs, which promotes deeper understanding and motivation (Loos, Gröpler & Goudeau 2023). It can also increase efficiency by automating administrative and instructional tasks, which tends to reduce the workload of educators, allowing them to focus on pedagogical innovation and research (Alimardani, 2024). Furthermore, AI tools can increase accessibility by providing support for students with disabilities in the form of alternative formats and personalised assistance to enhance learning inclusivity (Einarsson et al., 2024).

AI's integration with higher education is not merely a technological enhancement but a catalyst for systemic transformation in the digital era. It encourages a shift towards more learner-centred approaches, fosters innovation in curriculum design and promotes the development of digital literacy skills that are essential for the modern workforce (Krause et al., 2024). The current body of research indicates that, although AI offers substantial benefits to higher education, its successful implementation requires careful consideration of ethical, practical and pedagogical factors (Galindo-Domínguez et al., 2024). Ongoing collaboration among educators, technologists, policymakers and students is essential to harness AI's potential responsibly and effectively (Loos et al., 2023). In recognition of the advances made by AI in higher education, the purpose of this article is to enhance an understanding of the ways in which AI can be applied in the context of RPL and adult learning.

This article is structured as follows: first, key research questions are outlined. Subsequently, the theoretical framework grounding this discussion is introduced, situating AI within the constructivist learning theory. This is followed by a discussion of the qualitative methodology employed to analyse AI's role in RPL. The study then examines the intersection of AI and RPL in the context of adult learners and discusses the transformative potential of AI-driven assessments, while considering the ethical and practical implications. The discussion section expands on how AI can be leveraged for personalised student support; it is followed by recommendations for best practices and alignment with adult learning principles. The discussion includes essential themes such as the purpose and benefits, practice and ethical use of AI in addition to the impact of AI on RPL and the adult learning domain. Although the aim is not to advocate one point of view over another, the goal is to foster a comprehensive discourse that embraces and informs a balanced perspective on the use of AI in RPL practices (Butson & Spronken-Smith, 2024). In

particular, it explores the potential impact that the use of AI could have on adult learners from marginalised and disadvantaged backgrounds.

Recognition of prior learning through an artificial intelligence lens

For many adult learners, RPL is a gateway to higher education and provides recognition of informal and non-formal learning gained through work experience, self-directed learning or vocational training. However, the manual nature of traditional RPL – which relies heavily on subjective evaluations, extensive documentation and institutional bureaucracy – often creates barriers to accessing higher education (Kizito, 2006). It is proposed that AI can streamline RPL processes by automating the assessment of prior learning, enabling faster, fairer and more transparent evaluations.

Therefore, the research focus of this study was on critically examining the role of AI in RPL and assessing the way in which AI-driven technologies can enhance assessment accuracy, fairness and efficiency while maintaining the integrity of human judgement in evaluating prior learning. This article explores the following key areas:

1. The potential benefits of AI-driven RPL assessment;
2. Ethical challenges and concerns related to bias, transparency and data privacy;
3. Best practices for integrating AI into RPL frameworks, and
4. The future of AI in supporting adult learners who navigate RPL processes.

The key research questions identified in this study were:

1. How can AI enhance the assessment and validation processes in RPL?
2. What are the ethical implications of using AI in RPL assessments?
3. How can AI-driven tools be integrated into adult learner support systems within RPL frameworks?
4. What are the future directions for AI in RPL, and how can it support equitable access, student success and inclusive lifelong learning for adult learners?

AI offers promising advancements for RPL by enabling the automated assessment of prior learning, reducing subjectivity in evaluations and providing personalised learning pathways. AI-powered tools such as ML algorithms, NLP and predictive analytics have the potential to streamline RPL assessments, making them more consistent, objective and scalable. However, concerns about fairness, the ethical use of AI and the role of human evaluators in AI-mediated assessments must be carefully dealt with to ensure that AI serves as an enabler of, rather than a replacement for, human judgement (Al-Zahrani & Alasmari, 2024).

The use of AI in the RPL domain is not without challenges and there are ethical considerations that must be used to drive this innovation. These challenges include the extensive use of student data that necessitates robust measures to protect privacy and ensure ethical data-

handling (Roivainen, 2023). Another challenge is that AI systems can unintentionally perpetuate biases encoded in their training data, resulting in unfair or discriminatory outcomes (Katsamakas et al., 2023). To mitigate these risks, continuous monitoring, contextual validation and algorithmic auditing – periodic model retraining – are essential (Chan & Tsi, 2023).

Furthermore, the proliferation of AI-generated text introduces new challenges in maintaining academic integrity, because learners may misuse AI tools to produce or substantially enhance their submissions (Mahapatra, 2024). In an attempt to counter this, institutions are adopting AI-detection software; for example Turnitin now integrates an AI-writing report in its similarity checker. This tool flags AI-generated or AI-paraphrased text in two categories and suppresses low-level alerts (< 20%) to reduce false positives. However, according to some scholars, Turnitin clearly states it is not infallible; therefore, the results cannot be treated as definitive proof of misconduct. Instead, institutions are expected to interpret the findings in the light of academic integrity policies, disciplinary guidelines and professional judgement. In practice, this means that AI-detection results should serve as one piece of evidence within a broader evaluative process rather than as a stand-alone determinant of academic dishonesty (Ibrahim et al., 2025).

Critically, since its April 2023 release, Turnitin has evolved its system by updating thresholds, enabling paraphrase detection and expanding language support (including for Japanese and Spanish texts). Yet it acknowledges limitations in the case of near-human writing, hybrid AI–human mimicry and the risk of misflagging English second-language work. Given these constraints, no AI detector should be used as a stand-alone tool for making decisions about academic misconduct; rather, it should prompt a deeper review that is aligned with transparent institutional policy and educator oversight.

An interesting parallel is Grammarly's emerging 'Authorship' feature, which now distinguishes between AI-generated, AI-edited and human-typed text, offering users context and transparency about AI usage. Tools such as this emphasise the supportive, not the punitive, use of AI technology – fostering integrity while acknowledging the evolving academic ecosystem (Rao & Al-Obaidi, 2025).

Theoretical framework: Constructivist learning theory and artificial intelligence in recognition of prior learning

This study is underpinned by the constructivist learning theory (CLT), according to which learning is an active contextualised process in which individuals construct new knowledge based on their prior experiences and interactions with their environment (Piaget, 2005; Vygotsky, 1978). In the context of RPL, constructivism provides a robust foundation for understanding how adult learners integrate and apply previous knowledge to formal learning experiences. Recent scholarship, post-2022, has expanded our understanding of the way generative AI (GenAI) platforms align with constructivist learning principles in adult education. Adarkwah (2024) highlights the GenAI-infused Adult Learning Ecology (GenAI-ALE)

framework, which demonstrates how tools such as ChatGPT and Midjourney enable adult learners to engage actively with personalised learning pathways and to construct new knowledge in authentic contexts.

Similarly, Storey and Wagner (2024) discuss the ways generative AI tools foster metacognitive awareness and self-regulation by prompting learners to articulate their thinking and refine their understanding – key tenets of constructivist learning. Laupichler et al. (2022) further emphasise the need for AI literacy in higher education and suggest that integrating AI with adult learning environments can scaffold reflective and collaborative learning processes when approached with pedagogical intentionality. These emerging studies reinforce the reality that GAI can serve as an enabler of constructivist learning and support learners in contextualising, adapting and building on prior knowledge. Consequently, the inclusion of these recent insights, together with foundational constructivist theories, strengthens the rationale for exploring AI within RPL frameworks as a means to support inclusive, active and personalised adult learning.

The integration of AI in RPL assessment and learning aligns with constructivist principles by facilitating personalised, adaptive and self-directed learning pathways (Siemens, 2005). AI-driven tools can align prior learning, offer real-time feedback and provide customised learning interventions to ensure that adult learners engage in meaningful self-regulated learning experiences. Let us consider the following theoretical viewpoints. One of the key tenets of constructivist learning is that learners must actively engage with content, reflect on their understanding and apply knowledge in authentic contexts (Jonassen & Rohrer-Murphy, 1999). AI-powered adaptive learning platforms align with these principles by tailoring instruction based on learner progress, prior knowledge and learning preferences. For example, intelligent tutoring systems (ITSs), such as Carnegie Learning's MATHia and Knewton Alta, use ML algorithms to assess learners' strengths and weaknesses and adjust instruction dynamically (Ma et al., 2014).

In an RPL context, similar AI-driven systems can analyse portfolios and experiential learning narratives to identify competencies. Based on these learning gaps, AI tools can identify and recommend tailored learning modules to fill knowledge gaps. Further to this, scaffolding the learning processes through AI-based tutors can be offered to provide just-in-time support, taking the technology-enhanced implementation of RPL to greater heights. By incorporating constructivist AI tools, RPL processes are able to validate and build upon learners' existing knowledge, ensuring a learner-centred, contextualised assessment of prior learning (Ouyang, Zheng & Jiao, 2022).

The role of social constructivism can be used effectively to make sense of AI and scaffolding in RPL. This is because Vygotsky's (1978) social constructivist theory highlights the importance of social interaction and scaffolding in knowledge construction (Vygotsky, 1978). When effectively integrated with digital learning environments, the theory can facilitate peer collaboration, mentorship and guided learning – essential components of constructivist learning (Okunlaya, Syed Abdullah & Alias, 2022).

For instance, collaborative AI-powered platforms such as IBM Watson Education and Microsoft Teams AI Insights can align discussions and suggest relevant resources to support group learning (Jose, 2024; Holmes et al., 2018). In an RPL setting, AI can:

- Support peer review processes by providing automated feedback on written reflections;
- Facilitate expert mentoring by matching learners with industry professionals based on AI-driven skill analysis; and
- Enable AI-powered discussion forums where learners engage in reflective dialogue and receive AI-generated content recommendations.

These AI applications align with constructivist principles by promoting active engagement, reflection and collaborative knowledge construction (Laurillard, 2013).

Another key element of constructivist learning is metacognition – the ability to reflect on and regulate one's own learning processes (Schraw & Moshman, 1995). AI enhances self-regulated learning (SRL) in digital environments by providing personalised dashboards, predictive analytics and AI-generated study plans that can assist adult learners in driving their own learning. In RPL, these AI-driven SRL tools help learners to track their competency progress, reflect on their learning achievements and make informed decisions about their educational pathways (Sclater et al., 2016).

Most interesting in the domain of RPL is the potential to apply AI as a reflective learning partner in RPL. Reflection is central to constructivist learning (Moon, 2013). Moreover, AI can serve as a reflective learning partner by prompting learners to articulate their learning experiences, justify decisions and critically evaluate their own knowledge gaps. In these ways, they are led towards understanding their own student learning philosophy within a higher education setting. A good example of this application is the AI-powered writing assistants such as Grammarly's AI Tutor and Turnitin's Revision Assistant that provide personalised feedback on students' writing. This helps RPL learners to refine their learning narratives and portfolio submissions, self-assessment reflections on competencies and critical thinking (Haubt, 2024). By integrating AI into reflective learning activities, RPL frameworks can enhance learners' critical engagement with their prior knowledge and ensure deeper knowledge construction and retention (Boud et al., 2013).

Methodology

This study adopted a qualitative reflective research approach underpinned by constructivist learning theory (Piaget, 2005; Vygotsky, 1978). A reflective thematic analysis (Braun & Clarke, 2021; Braun et al., 2023) was accordingly employed to explore critically the ways in which AI can enhance RPL practices in adult education, focusing on the themes of transformation, ethical practice, personalisation and empowerment. The research drew on a combination of scoping review findings, empirical case studies, and theoretical insights from digital pedagogy and AI integration in higher education.

Data sources and literature selection criteria

To ensure rigour, a comprehensive and systematic literature search was undertaken across multiple electronic databases, aiming for a broad and inclusive coverage of relevant studies. Given the varied terminology used to describe RPL across different regions and contexts, alternative terms such as validation of prior learning (VPL), prior learning assessment and recognition (PLAR) and accreditation of prior learning (APL) were incorporated into the search. This strategy expanded the search scope and reduced the likelihood of omitting relevant key literature.

The selected databases included Academic Search Premier (EBSCOhost), ERIC (EBSCOhost), Google Scholar, Web of Science, Sabinet African Journals and several institutional research repositories. Each was purposefully chosen for its relevance and capacity to provide access to high-quality, peer-reviewed research. For example, Web of Science and Academic Search Premier enabled access to internationally recognised journals, offering a global perspective, whereas Sabinet African Journals was included to capture context-specific research from South Africa – an essential element for understanding local RPL practices.

To establish credibility, a systematic and transparent search strategy was employed. Search terms were thoughtfully developed and aligned with the research questions and informed by existing literature. These terms were refined and applied consistently across databases to support the study's focus on technology, online learning and RPL, which served to ensure reproducibility and methodological integrity. The review included 26 of the most relevant papers that could answer the research questions posed in this study. The literature screening process followed clear inclusion criteria to ensure that only studies which met the following criteria were included:

- A focus on AI applications in RPL assessment or validation contexts;
- Dealing with adult learning in post-secondary education;
- Presenting empirical evidence (qualitative, quantitative, mixed-methods) or systematic reviews; and
- Examining ethical and assessment-related implications of AI in RPL.

Studies focusing exclusively on traditional non-AI methods, K-12 settings or editorial- or opinion-based content were excluded. A holistic judgement approach ensured alignment with the thematic concerns of this study (Laupichler et al., 2022).

Thematic analysis process

A six-phase, reflexive thematic analysis approach (Braun & Clarke, 2021; Braun et al., 2023) was adopted to analyse the extracted data. The steps included:

1. Familiarisation with the literature and reflective materials;
2. Initial coding of repeated patterns and keywords related to AI integration, ethics, assessment and learner empowerment;
3. Generation of preliminary themes;

4. Review and refinement of themes in the light of constructivist theory and adult learning principles (Knowles et al., 2014);
5. Definition and naming of key themes: transformative tools, digital support, student empowerment and academic upskilling; and
6. Synthesising themes into a coherent narrative aligned with the research questions and theoretical framework.

This analytical strategy allowed for the integration of both the conceptual and the empirical dimensions of AI-enhanced RPL. The themes were subsequently mapped to a student-centred model for AI-RPL integration proposed in the discussion section.

As ethical challenges emerged strongly across the included literature, these were coded and categorised based on the following dimensions:

- Data privacy and consent (Al-Zahrani & Alasmari, 2024);
- Algorithmic fairness and bias (Stahl & Stahl, 2021);
- The transparency and explainability of AI systems (Chan & Tsi, 2023), and
- The role of human oversight (Butson & Spronken-Smith, 2024).

Results

This section presents the results of the reflective thematic analysis, systematically unpacking how AI applications intersect with RPL practices and adult learning in higher education. Drawing on recent empirical and conceptual studies, and also on foundational theories of adult learning and digital andragogy, the findings highlight the dynamic and transformative potential of AI in RPL. Key themes – transformative tools, digital support, student empowerment and academic upskilling – emerged as central pillars that can guide AI integration to support adult learners, particularly in the contexts of disadvantage and lifelong learning. The analysis synthesises both global and local perspectives, reflecting on ethical considerations, institutional practices and the broader implications for inclusive, equitable access in higher education. These findings establish the groundwork for exploring AI's potential to reshape RPL in the post-school education and training sector, as detailed in the following subsections.

Artificial intelligence and recognition of prior learning: Transformative intersection

A critical, reflective thematic analysis of AI applications in RPL and adult learning has highlighted the fact that there is a critical need for innovation in RPL, specifically to support adult learners in the digital age. Transformative tools, digital support, student empowerment and academic upskilling were identified as key themes throughout this study. An overview of the literature covered in this study is given in Table 1. Furthermore, these themes were applicable not only in the RPL adult learning setting but could also be applied to the post-school education and training setting, especially in the context of technical and vocational education and training (TVET) and industrial or workplace intersections.

The use of AI in RPL represents a substantial milestone and a transformative intersection for people from disadvantaged backgrounds – especially in the South African context where RPL is rooted in a policy to redress or eradicate social injustice and broaden access to higher education (Osman, 2003).

Globally, RPL – sometimes referred to as validation of prior learning (VPL) or prior learning assessment and recognition (PLAR) – is a critical mechanism for providing access to higher education by validating informal and non-formal learning and life experiences (Conrad, 2008). Traditionally, RPL assessments rely heavily on human evaluators, making the process time-consuming and subjective. But AI-powered tools, such as ML algorithms and NLP, now offer solutions for automating portfolio assessment, for analysing experiential learning narratives and for personalising feedback (Khasawneh et al., 2025). AI-enhanced RPL systems have the potential to analyse textual and multimedia evidence submitted by learners, which provides adaptive assessments that tailor evaluation to an individual's knowledge base. Moreover, Chatbots and AI tutors are used to guide learners through the RPL process and ensure consistency in assessment judgements by reducing human bias (Khasawneh et al., 2025). However, despite its advantages, integrating AI into RPL assessment requires careful consideration of the ethical and practical challenges, particularly regarding bias and fairness. AI models must be trained on diverse representative datasets to prevent perpetuating biases that could disadvantage under-represented learners (Stahl & Stahl, 2021).

Other critical factors for consideration include transparency: AI decision-making processes should be explainable and ensure that learners understand how their prior learning is evaluated. There should be an adequate level of human oversight: AI should complement, not replace, human judgement in assessing complex learning experiences. Finally, protecting learners' personal and experiential data is paramount in AI-driven assessments (Stahl & Stahl, 2021). In RPL, the opportunities for AI to support the analysis of portfolios, experiential learning narratives and prior coursework in order to assess competencies objectively is an innovation within the transformational and developmental models of RPL applications. Examples of these applications are AI-Powered Chatbots and Virtual Tutors and AI-driven chatbots such as IBM Watson Tutor; they provide around-the-clock academic support, helping adult learners navigate their studies. These tools are especially beneficial to RPL students, who often require flexible support outside traditional academic hours (Costin et al., 2023).

In another application related to RPL and adult learners, GAI in research and writing tools such as ChatGPT and Claude can help with academic writing, literature reviews and research synthesis (Ferrag & Bentounsi, 2024). Although beneficial, these tools also raise ethical concerns about plagiarism and academic integrity; nonetheless, they open new opportunities for transformation in teaching and learning (Al-Zahrani & Alasmari, 2024; Stahl & Stahl, 2021). The existing literature emphasises that efficiency, scalability, equity, access and ethical challenges are key factors that will drive the synergistic impact of AI and RPL in higher education (Butson & Spronken-Smith, 2024).

AI has the potential to accelerate the assessment processes of RPL applications, thereby reducing the administrative burden and allowing adult learners to explore their potential and career opportunities ahead of formal assessment procedures offered in higher education (Osman, 2003). In a recent study, the deep integration of administrative actions and AI-driven algorithms has given rise to algorithmic administration in university governance, showcasing unique advantages in administrative efficiency, decision-making, management models, service delivery, resource allocation, internationalisation and communication (Fasi, 2022).

AI has the ability to drive equity and access, as it minimises human bias in assessments and promotes fairness (Stahl & Stahl, 2021). In addition, ethical challenges must be carefully considered to ensure that matters such as data privacy, algorithmic bias and accountability are managed to ensure responsible AI integration (Humerick, 2017). These advancements and potentially viable applications suggest that AI will continue to revolutionise higher education, particularly for those adult learners seeking recognition for their prior knowledge and experience. Future research should explore AI's long-term impact on student outcomes, their lived experiences and the institutional policies that support the use of AI in the RPL sector. AI is rapidly transforming higher education by reshaping the ways in which teaching, learning and assessment are conducted and has significant implications for adult learning and RPL. The integration of AI in RPL presents both opportunities and challenges, requiring a careful balance to be struck between technological efficiency and ethical considerations.

By exploring the intersection of AI and RPL, this article contributes to ongoing discussions in higher education about the role of technology in widening access to learning opportunities. By specifically examining key themes such as transformative tools, digital support, student empowerment and academic upskilling, AI can be purposefully interconnected as a central aspect of AI and adult learning across the context of the post-school education and training sector. AI has the potential to revolutionise RPL by making it more accessible, transparent and equitable. However, the successful integration of AI in RPL requires a commitment to ethical AI implementation, continuous improvement of AI models, extensive resources and collaboration between AI developers, educators and policymakers to ensure that adult learners are supported in meaningful and inclusive ways (Katsamakas et al., 2024).

The use of AI in the adult learning domain has received attention through multiple frameworks that have been proposed to enhance adult learning experiences. In a German study, the generative artificial intelligence adult learning ecology (GenAI-ALE) framework was used to highlight key applications in adult learning through the use of Dall-E-2, ChatGPT, Synthesia, Midjourney, Perplexity and InstructGPT (Adarkwah, 2024). The present study has also reported a comparison of traditional adult learning methods with GenAI-infused learning approaches (see Table 1 for more information). The study emphasises that, despite the expanding literature on GenAI's impact on education recently, there are still few studies that focus on adult education and learning. As a theoretical implication, the study calls for further investigations into implementing GenAI in adult higher education such as

implementing and contextualising the GenAI-ALE framework in different educational settings in the post-school education and training sector (Adarkwah, 2024).

In Romania, the implications of leveraging ML and AI for the transformation of adult education and vocational training was explored (Costin et al., 2023). The study indicated that ML and AI enhance adult education by enabling personalised learning, adaptive assessments and greater accessibility, making education more efficient and inclusive. These technologies transform knowledge acquisition and align learning with the evolving demands of the labour market. This independent study reiterates that the application of digital tools, technology and AI collectively have the potential to reshape adult education and training. This results in a more adept and adaptable workforce, thus creating lasting benefits for society (Costin et al, 2023).

In another study, the intersection of sustainability, pandemic-related distance learning and AI-driven opportunities in adult education was explored (Rott & Schmidt-Hertha, 2024). The argument indicated that sustainable education integrates environmental and social awareness while ensuring inclusivity and resource efficiency, with distance learning providing flexible access for adult learners who have to balance work and family against their learning. AI enhances learning processes by personalising learning, streamlining administration and creating immersive experiences, although challenges such as digital equity, data privacy and algorithmic bias must be resolved. In a comprehensive scoping review, Laupichler et al. (2022) emphasised the rapid growth and integration of AI in the education sector. They therefore identified the need for adult learners to be integrated with the associated benefits of AI in a well-structured and social approach. The present study argues that as AI becomes more integrated into daily life, developing AI literacy among adult learners in higher education is becoming increasingly essential to enabling effective interaction with the technology and the students' success (Laupichler et al., 2022).

TABLE 1: Overview of the literature reviewed: Exploring AI in RPL and adult learning

STUDY	RESEARCH FOCUS	METHODOLOGY	AI TOOLS/ TECHNOLOGIES	KEY FINDINGS
Gupta et al. (2022)	Adaptive learning systems in higher education	Empirical	Predictive modelling, analytics	Supports personalised, student-specific content delivery
Laupichler et al. (2022)	AI literacy in adult education	Scoping review	General AI tools	Need for structured AI integration and digital literacy training
Anuyahong et al. (2023)	Personalised learning and adaptive assessment	Mixed-methods	AI-based systems (unspecified)	Improved engagement, motivation, personalisation
Chan & Tsi (2023)	AI tutor applications	Conceptual + Empirical	ChatGPT, Watson AI	Adaptive support, student-centred learning environments

STUDY	RESEARCH FOCUS	METHODOLOGY	AI TOOLS/ TECHNOLOGIES	KEY FINDINGS
Costin et al. (2023)	AI and vocational adult education	Empirical	Machine Learning	Improved accessibility, adaptive learning, labour market relevance
Moorhouse et al. (2023)	Guidelines for AI assessment integration	Systematic Review	ChatGPT	Academic integrity and ethical use guidelines
Adarkwah (2024)	GenAI in adult learning	Conceptual framework	ChatGPT, Synthesia, Perplexity, Midjourney	Adult learning personalisation, need for more studies in GenAI-RPL
Al-Zahrani & Alasmari (2024)	AI's educational and ethical implications	Review	General AI	Emphasises ethical safeguards and AI governance in RPL
Eshraghian et al. (2024)	Emotions and AI in education	Mixed-methods	AI workplace integration	Enhances educator efficiency and emotional awareness
Katsamakas et al. (2024)	AI systems thinking in HEI	System modelling	General AI	Feedback mechanisms; ethical modelling for institutional use
Kolade et al. (2024)	Use of ChatGPT in learning and assessment	Quasi-experimental	ChatGPT	High-quality content; referencing challenges
Krause et al. (2024)	Predictive analytics for student success	Systematic review	Predictive AI	Enables early intervention through outcome forecasting
Lyanda et al. (2024)	AI innovations in education	Mixed-methods, systematic review, meta-analysis	ChatGPT, NLP, ITS, ML, Chatbots, automated grading systems	Personalisation; assessment accuracy; real-time feedback
Mahapatra (2024)	AI and writing skills in English second language (ESL)	Mixed-methods	ChatGPT	Positive learning outcomes; concerns over plagiarism
Rott & Schmidt-Hertha (2024)	AI, technology, environment and content changes in adult learning post-pandemic	Systems review	General AI tools	Personalised learning; inclusivity; ethics
Valaboju (2024)	Reinforcement learning in assessment	Systematic review	Reinforcement learning	Personalised, dynamic assessments; real-time feedback
Khasawneh et al. (2025)	Emotion regulation and portfolio assessment	Mixed-methods	AI-enhanced portfolio systems	Mindfulness; language attitudes; narrative analysis

STUDY	RESEARCH FOCUS	METHODOLOGY	AI TOOLS/ TECHNOLOGIES	KEY FINDINGS
Storey & Wagner (2025)	Integrating AI into adult education	Conceptual review	(LLMs), (ALS), Chatbots, (VR/ AR), Learning Analytics (LA)	Explores: generative AI for personalised learning; ethical implications; and adaptive assessment

Source: This table was created by the author during the knowledge synthesis of this study

Discussion

This discussion systematically answers the four research questions posed in this study using the conceptual motion model (Figure 1) as an organising framework that systematically aligns the AI-enhanced RPL practices with the adult learner and the themes associated with the findings of this study.

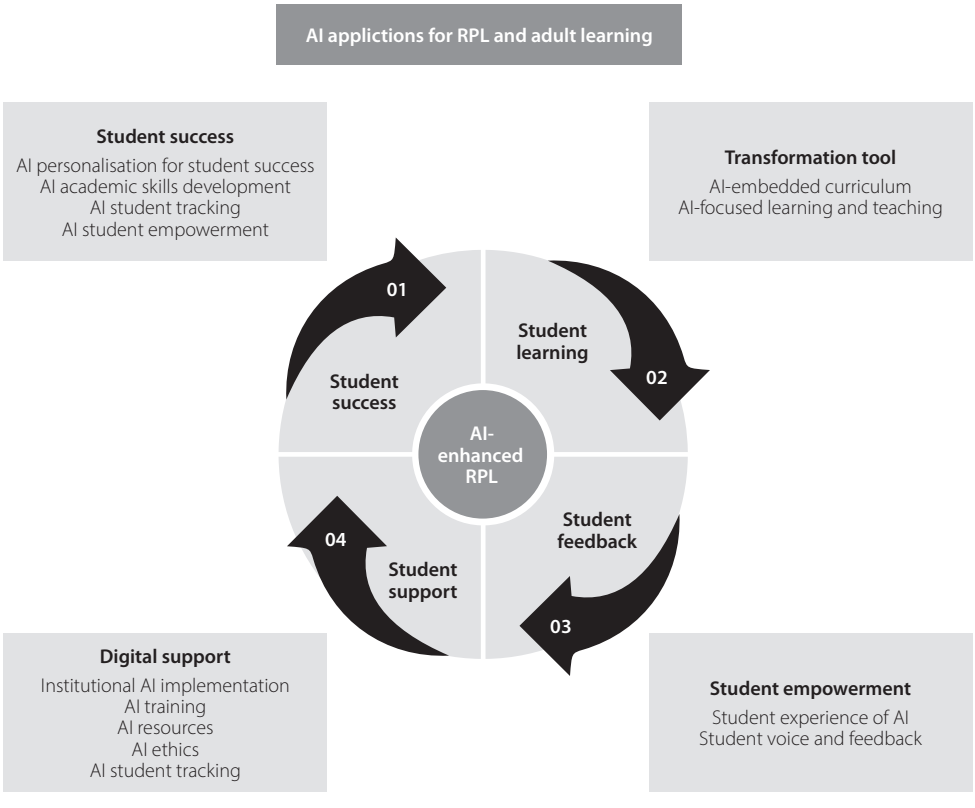

FIGURE 1: AI-enhanced RPL conceptual motion model: Adult learner student-centred opportunities for transforming adult learning in higher education

Source: This figure was created by the author for the purpose of data illustration and discussion of the present study.

The model – developed from the identified themes of transformative tools, digital support, student empowerment and academic upskilling – illustrates how AI can be strategically integrated to support adult learners navigating RPL processes.

In addition, the research questions presented in this study are revisited with a view to promoting an understanding of the themes revealed in the study.

1. How can AI enhance assessment and validation processes in RPL?

AI has the potential to revolutionise assessment in RPL by automating traditionally subjective, labour-intensive evaluations. ML algorithms, NLP and predictive analytics can analyse experiential learning narratives, reducing human bias by offering more objective and consistent evaluations (Khasawneh et al., 2025). In line with the motion model's transformative tools pillar, these AI applications support equitable assessment by validating diverse adult learning experiences (Adewale, 2024). This enhanced assessment process promotes fairness and efficiency, streamlining portfolio evaluations and supporting broader access for adult learners, particularly for those from historically disadvantaged groups (Kizito, 2006; Stahl & Stahl, 2021).

2. What are the ethical implications of using AI in RPL assessments?

Despite these benefits, ethical concerns are paramount. AI models can inadvertently perpetuate existing biases if trained on unrepresentative data, potentially disadvantaging under-represented learners (Katsamakas et al. 2024). Dealing with these concerns requires deliberate attention to be paid to data diversity, algorithmic transparency and human oversight (Stahl & Stahl, 2021; Chan & Tsi, 2023). Within the motion model, the digital support pillar emphasises the importance of explainable AI and accessible digital environments to foster trust and accountability. Institutions must ensure that AI complements rather than replaces human judgement, which serves to reinforce that fairness and integrity remain central to RPL assessments (Butson & Spronken-Smith, 2024).

3. How can AI-driven tools be integrated into adult learner support systems within RPL frameworks?

AI-driven tools such as chatbots – for example, IBM Watson Tutor – and intelligent tutoring systems offer flexible, personalised support to adult learners, especially those balancing work, family and studies (Siemens, 2005; Ferrag & Bentounsi, 2024). The motion model's student empowerment and digital support pillars encapsulate this alignment: AI-powered platforms provide adaptive guidance, real-time feedback and tailored learning modules that help adult learners to self-regulate and build confidence. Furthermore, generative AI tools such as ChatGPT and Claude facilitate academic writing and reflective learning processes, opening up new avenues for lifelong learning, although they raise important questions about plagiarism and academic integrity (Al-Zahrani & Alasmari, 2024; Mahapatra, 2024).

4. **What are the future directions for AI in supporting adult learners navigating RPL processes?**

Looking ahead, AI will continue to evolve, offering increasingly sophisticated support for adult learners in RPL contexts. The motion model's academic upskilling pillar emphasises the need for AI-powered interventions that not only assess prior learning but also recommend targeted micro-learning modules and digital literacy training – enabling learners to bridge knowledge gaps and thrive in dynamic work environments (Costin et al., 2023; Adarkwah, 2024). As demonstrated by studies on algorithmic administration in higher education (Fasi, 2022), AI's role in RPL extends beyond assessment to broader institutional processes that have an impact on access, fairness and administrative efficiency.

The integration of the motion model (see Figure 1) illustrates this conceptual motion model for AI-RPL, detailing the four pillars – transformative tools, digital support, student empowerment and academic upskilling – as interconnected target areas. These pillars are not static; rather, they represent dynamic outcomes that should be continuously refined through ethical AI governance, policy development and human-centred design (Laupichler et al., 2022). By explicitly aligning these pillars with the research questions, the model emphasises a holistic approach that leverages AI to create equitable, transparent and empowering RPL experiences for adult learners.

In addition to the conceptual motion model and its alignment with the four research questions, this section explores best practices, adult learning principles and broader systemic considerations that strengthen AI's transformative potential in RPL further. This expanded discussion also highlights best practices for AI implementation in RPL, aligning it with the four pillars of the motion model (Chan & Tsi, 2023; Vetrivel et al., 2025). These practices emphasise the importance of hybrid AI–human assessment models, where AI enhances – rather than replaces – human judgement. Moreover, ongoing professional development for educators ensures that they can ethically and effectively leverage AI tools in RPL contexts, while learner-centric approaches such as those embedded in the motion model (Figure 1) ensure that AI applications remain inclusive and aligned with adult learner needs.

Equally important is the synergy between AI-enhanced learning and adult learning principles. As shown in Table 2, AI-powered personalisation, adaptive assessments and real-time feedback align strongly with Knowles' andragogical framework (Knowles, 1978; Knowles et al., 2014). For example, AI-driven analytics offer self-directed and problem-centred learning opportunities, whereas gamified learning environments and virtual laboratories promote intrinsic motivation and readiness to learn (Paranjape et al., 2019; Banik & Gullapelly, 2025). These alignments highlight AI's ability to honour adult learners' autonomy and leverage their prior experiences for meaningful engagement (Krause et al., 2024).

Despite these promising intersections, challenges remain. The digital divide persists as a significant barrier to marginalised adult learners, who may have limited digital literacy or lack access to AI-driven RPL tools (Aithal & Aithal, 2024; Al-Zahrani & Alasmari, 2024).

Dealing with algorithmic bias, data privacy and ethical concerns is essential to ensuring that AI does not inadvertently reinforce existing inequities (Humerick, 2017; Lin, 2024). Stakeholders – including educators, policymakers and AI developers – must engage in ongoing dialogue to ensure that AI-enhanced RPL processes are transparent, fair and accountable (Storey & Wagner, 2024).

Comparisons of traditional adult learning methods with GenAI-infused approaches (Adarkwah, 2024) also demonstrate the potential for AI to transform learning activities, assessment practices and feedback mechanisms for adult learners. However, technology-enhanced RPL processes remain underdeveloped compared with other digital education innovations (Cameron et al., 2014). Without deliberate strategies for equitable AI adoption, there is a risk of perpetuating exclusion rather than democratising access to education.

Encouragingly, the principles of adult learning (andragogy) and AI-enhanced learning align in multiple ways, creating a synergy that supports adult learners in higher education. Table 2 comprises an analysis of Knowles' adult learning principles and their alignment with AI-driven learning applications (Knowles, 1978; Knowles et al., 2014; Malcolm, 1978).

TABLE 2: Analysis of adult learning principles aligned with AI-driven learning applications

KEY PRINCIPLES OF ALIGNMENT	ADULT LEARNING PRINCIPLES	AI-DRIVEN
1. Self-directed learning and AI-powered personalisation	Adults prefer self-directed learning experiences, where they take ownership of their education and make decisions about what and how they learn (Knowles, 1978; Knowles et al., 2014).	AI-driven adaptive learning platforms (e.g. Coursera, Duolingo and AI tutors) personalise learning pathways, allowing learners to progress at their own pace. AI also provides recommendations based on past learning behaviour, thus supporting autonomy.
2. Prior experience as a learning resource and AI-enabled RPL	Adults bring rich, prior knowledge and experiences to their learning, which should be leveraged for deeper engagement.	AI-powered RPL assessment tools analyse previous learning (e.g. work experience, certifications or prior coursework) to grant credit or place learners in appropriate courses. AI can also evaluate digital portfolios and experiential narratives to recognise informal learning.
3. Readiness to learn and AI-driven just-in-time learning	Adults learn best when they see immediate relevance to their personal or professional goals.	AI-driven tools provide just-in-time learning, offering micro-learning modules, on-demand courses and chatbots that support learners at the moment of need.
4. Problem-centred learning and AI-powered simulations	Adults prefer problem-solving approaches over rote memorisation, engaging best with real-world applications.	AI supports scenario-based learning through simulations, virtual laboratories and intelligent tutoring systems that offer real-world problem-solving experiences.

KEY PRINCIPLES OF ALIGNMENT	ADULT LEARNING PRINCIPLES	AI-DRIVEN
5. Intrinsic motivation and AI-driven engagement strategies	Adults are intrinsically motivated, learning for career advancement, personal development or lifelong learning goals.	AI enhances motivation through gamification, adaptive learning paths and AI-generated feedback that encourages continuous progress.
6. Need for practical and immediate application and AI-based learning analytics	Adults prefer learning that is immediately applicable to their careers and daily lives.	AI-powered learning analytics track learner progress, provide predictive insights and recommend next steps to ensure skills are applied in real-world contexts.

S*ource: This table was created by the author for the analysis and discussion of this study.*

Conclusion

The integration of AI into RPL presents transformative opportunities for adult learners, enabling greater access to higher education through more efficient, transparent and equitable assessment processes. AI-driven tools offer a range of benefits, from automating portfolio evaluations to providing personalised learning pathways. However, the successful implementation of AI in RPL depends on balancing technological efficiency with ethical practice and human-centred andragogy. Transformative tools, digital support, student empowerment and academic upskilling emerged as key themes in this study, highlighting the motion model's relevance in framing AI's role in inclusive adult learning.

Importantly, while generative AI offers promising applications for scaffolding, reflection and personalising learning, challenges regarding hallucinations – where AI generates inaccurate or fabricated outputs when data is missing – pose a significant concern. Such inconsistencies emphasise the need for rigorous human oversight and transparent vetting processes to ensure the integrity and accuracy of AI-enhanced assessments. As this discussion has shown, the intersection of AI and RPL holds significant promise for adult learners who navigate lifelong learning pathways, but it also demands careful, critical implementation to avoid reinforcing biases or compromising educational standards.

Future research should prioritise empirical evaluations of AI's impact on adult learner outcomes, particularly in marginalised communities, and explore the ways in which frameworks such as GenAI-ALE (Adarkwah, 2024) can be adapted to ensure equitable RPL practices. Collaborative innovation among educators, AI developers and policymakers will be essential to realising AI's transformative potential – ensuring that RPL processes become more inclusive, transparent and empowering for a diverse range of adult learners worldwide.

Disclosure statement

The author declares no competing interests. The author declares no relevant or material financial interests that relate to the research described in this article.

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Skills ecosystems mapping: An analysis of installation repair maintenance by medium, small and micro-enterprises

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ABSTRACT

This article argues that, although skills policies and approaches have been located largely within a neoliberal paradigm, given the reality of African labour markets, a more place-based approach to framing skills development in building local economies is needed. Using the context of installation repair maintenance hubs in four South African townships, this article presents a framework that moves beyond the individual to organisations and systems. It uses skills ecosystem framing to examine the dynamics that underpin the skills needs of medium, small and micro-enterprises in the IRM hubs. By applying skills ecosystems framing, the article explores the interactions between stakeholders. This approach highlights the importance of skills development in building local economies and reflects the way in which it can systemically support economic growth. The article therefore indicates that decontextualised notions of skills and training cannot facilitate local transitions. Using a mixed-methods approach, our research combined qualitative and quantitative data-collection techniques, including interviews and surveys, exposing challenges.

KEYWORDS

Skills ecosystems; skills supply and demand; medium, small and micro-enterprises (MSMEs); local economic development; installation repair maintenance (IRM); skills development

Introduction

Formal vocational education and training (VET) systems in sub-Saharan Africa remain small, fragmented and disconnected from the labour market (Allais, 2022), with a continuing emphasis on wage employment (McGrath et al., 2020). The African reality of the informal economy, which is an important employer of youths across Africa, is not covered in VET and skills policy. This means that labour market realities in sub-Saharan Africa are at odds with the normative linear expectations of formal VET systems. In the African context of an extensive informal sector, creative solutions are needed to unlock the demand on a scalable basis by actively dealing with the barriers to broad-based enterprise growth. The installation repair maintenance (IRM) initiative,[1] central to this research, sought to unlock the full potential of artisanal industries across the industrial economy to enable skills development and employment creation. The IRM initiative operated on the hypothesis that the informal economy offers significant potential for employment creation.

Therefore, medium, small and micro-enterprises (MSMEs) have been identified as key components with which to advance inclusive growth and development to build local economies in South Africa (Bhorat et al., 2018). The National Planning Commission (NPC), which is responsible for compiling the South African National Development Plan (NDP), envisaged that 90% of 11 million jobs would be generated by small enterprises in 2030 (NPC, 2024). However, according to the Stats SA Quarterly Labour Force Survey (QLFS) (StatsSA, 2024b), the unemployment figure for Quarter 2 (Q2) in 2024 was 8.4 million, with 158 000 more unemployed individuals being added between Q1 and Q2. This increased the unemployment rate by 0.6% to 33.5%. Between 2014 and 2024, the proportion of long-term unemployed rose from 65.8% to 76.2%. The formal sector accounts for 68.9% of total employment. While the number of jobs in employment sectors decreased between Q1 and Q2 2024, employment in the informal sector increased by 48 000 jobs (Stats SA, 2024a; Stats SA 2024b).

MSMEs could possibly play a crucial role in local skills development by providing on-the-job training, apprenticeships and mentorship opportunities that equip workers and youths with practical skills. This could present an opportunity for technical and vocational education and training colleges (TVET) students to use MSMEs to gain workplace experience within the broader VET system. By fostering stronger relationships between these local institutions and small businesses, work-integrated learning (WIL) opportunities could be increased to better align skills development with industry needs. This would lay a foundation for stronger local economies. However, while MSMEs have the potential to drive skills development, many experience significant challenges that limit their ability to do so effectively. For instance, many MSMEs operate informally, rendering it difficult for them to engage with formal skills development initiatives (Rogerson, 2019). In addition, the high failure rate of MSMEs resulting from economic pressures, regulatory burdens and market competition, also hinders their ability

1 The IRM initiative is a programme that is run by the National Business Initiative (NBI), in collaboration with various stakeholders, focused on expanding and growing pathways for young people to access IRM occupations.

to invest in workforce training (Cant & Wiid, 2013; Molefe, Meyer & De Jongh, 2020). As a result, although MSMEs could be key players in skills development, the current reality often sees them struggling to fulfil this role at scale.

In response to this problem, the National Business Initiative (NBI) initiated a programme in 2019 that aims to unlock scalable income opportunities for unemployed youths and to support MSMEs in the IRM sector.[2] IRM-related MSMEs offer a wide range of services, including construction, the production of chemicals for cleaning and pest control, building maintenance and installation, and the maintenance and repair of various appliances and systems.

The research investigated the potential to establish IRM hubs at local technical and vocational education and training (TVET) colleges and to build strategic alliances and partnerships with local businesses in order to strengthen local skills ecosystems. By strengthening partnerships between MSMEs, training institutions and local economic development initiatives, this empirical work sought to contribute to both enterprise growth and employment outcomes. The integration of structured skills development in MSMEs not only supports their sustainability but also creates pathways for youth employment and self-employment, particularly in townships, where access to formal job markets is limited. Through these efforts, the initiative attempts to bridge the gap between skills supply and demand, fostering a more inclusive and resilient local economy.

The research explored the mapping of skills ecosystems in four areas: Atlantis (Western Cape), Mandeni (KwaZulu-Natal), Katlehong and Mamelodi (both in Gauteng). These sites have unique dynamics and their own local context. The skills ecosystem mapping sought to understand the opportunities and challenges associated with building a local skills ecosystem to support IRM MSMEs at these sites and to identify the skills needed to enable them to grow. Broadly speaking, the research sought to identify

- Areas of potential IRM demand;
- The challenges associated with unlocking latent IRM demand;
- The support required to enable youths to access this demand; and
- The barriers that may inhibit youths and MSMEs from accessing these demand opportunities.

After locating MSMEs within the local skills ecosystem, this article presents key findings from the skills ecosystem mapping across the four case studies. We then present recommendations from our findings and insights into what we learnt about skills ecosystem mapping. In addition, we reflect on the way in which the insights gained from the skills ecosystem mapping can be generated in an ongoing manner to make it possible for institutions to identify fault lines in the skills ecosystem and to intervene to optimise the functioning of these skills ecosystems.

2 The focus of IRM enterprises includes manufacturing, plumbing, electrical work, general maintenance, domestic appliance repair, autobody repair and cellphone repairs.

Understanding skills ecosystems

Skills ecosystems play a crucial role in shaping the ways in which skills are developed and deployed in specific regions or sectors. They are defined as regional or sectoral social formations in which a skill is developed and deployed; and they emphasise the importance of understanding the context in which skills are developed and used. The model therefore emphasises a more regional, place-based model for skills planning that focuses on the 'distributed agency' that is needed across individuals, organisations and systems (Ramsarup & Mohamed, 2022).

The concept of the skills ecosystems model has not previously been applied in southern African contexts. However, Lotz-Sisitka and McGrath (2023) highlight its relevance, especially given the complexities of work outside of formal employment and the urgent sustainability challenges. As a result, scholars have sought to understand the terrain better by using skills ecosystem mapping to strengthen the design of interventions (Wedekind et al., 2021; Ramsurup et al., 2022; Lotz-Sisitka & McGrath, 2023; Ramsarup et al., 2023; Ramsarup & Russom 2023; VET Africa 4.0 Collective, 2023; Spours, 2024).

The ecosystem model foregrounds a place-based model of skills development and has been used to map differing contexts in Africa (Wedekind et al., 2021). Using this approach in both Uganda and South Africa, researchers have concluded that the model helped to provide a rich story of the complexities in local skills ecosystems; and that the skills ecosystem mapping helped to identify limitations in, and opportunities for, strengthening skills supply and demand (Wedekind et al., 2021).

In this study, we drew on Spours (2019; 2024), who builds on his skills ecosystems work to enhance our understanding of learning and skills development by integrating a political economy perspective into the existing learning ecological framework. This was particularly crucial to analysing power relations, because the model enabled us to understand who gains access to resources, who participates in decision-making and whose knowledge is valued. The model identifies three core dimensions of a strong skills ecosystem:

- First, collaboration between a range of stakeholders, including key institutions and system leaders in a local area (horizontal connectivities);
- Second, the top-down policies, regulations and funding streams that enable or constrain the regional skills ecosystem (facilitating verticalities); and
- Third, the points where these two interact, often through a 45-degree mediation (Wedekind et al., 2021).

This model offers a useful conceptual and descriptive device for understanding and analysing skills ecosystems, focusing as it does on collaboration, policy and interaction to support effective skills development in a specific region.

In this research, we framed a skills ecosystem as being a dynamic and multi-layered network of stakeholders, intermediaries and policy enablers that are able to support MSMEs. The model (see Figure 1) is an adaptation of the Spours (2019; 2024) model by Ramsarup et al. (2022), contextualised to reflect the specific needs, challenges and opportunities in MSMEs, which are a central phenomenon in this research. Figure 1 illustrates the multi-scalar and temporal complexity of a skills ecosystem, indicating the way that different levels (individual, organisational, systemic and the broader political economy) interact over time to shape the skills ecosystem. This includes facilitating state verticalities, such as national policies, regulations and funding streams, that can either enable or constrain the regional skills ecosystem (Ramsarup et al., 2022). This multi-level framing informed our data collection and the design of the tools.

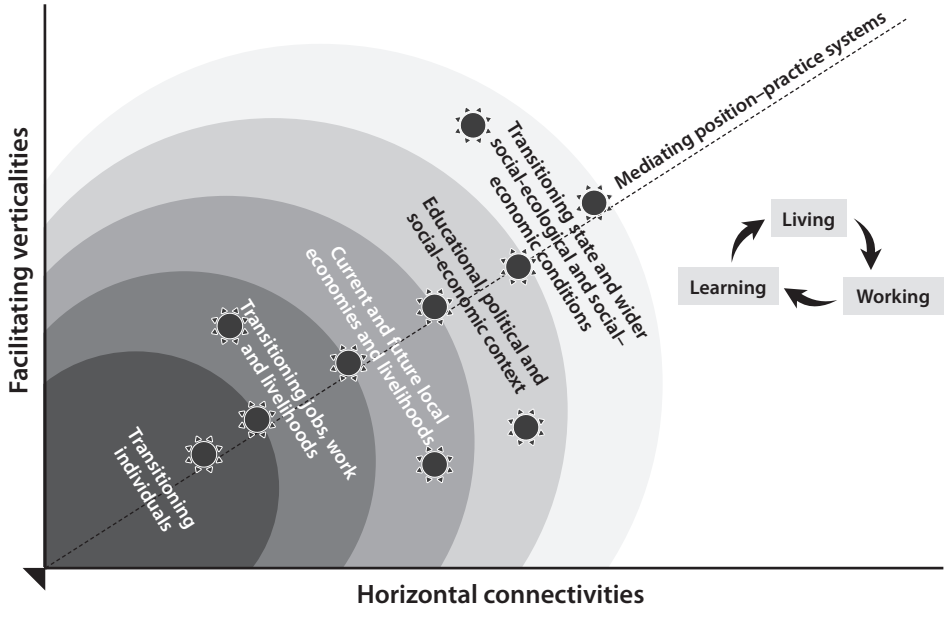

FIGURE 1: Multiple transitioning across work and societal contexts

*Note: * in the diagram indicates the position-practice systems of different agents and their networks that possibly contribute to relations of emergence in the system overall.*

Source: Adapted from Spours, 2019, Ramsarup et al., 2022 and Spours, 2024

Locating medium, small and micro-enterprises in the local skills ecosystem: The literature

MSMEs in South Africa encompass various categories based on employment size and economic activities, and they range from survivalist enterprises to medium-sized businesses (Marnewick, 2014; Wiid & Cant, 2013). The South African definition of MSMEs, according

to the amended National Small Enterprise Act (Act 102 of 1996), considers the total full-time equivalent of paid employees and annual turnover per industry category (Republic of South Africa, 1996). Medium-sized enterprises employ 51–250 full-time employees, small enterprises 11–50 and micro-enterprises 0–10. Turnover varies by sector, helping to shape interventions that respond to each category's needs (Department of Small Business Development (DSBD), 2022).

Many MSMEs are based in townships and face significant challenges that hinder their growth and sustainability compared with their urban counterparts. These challenges include limited access to finance and to larger markets, poor infrastructure and a skills gap that is attributed to inadequate access to education and training opportunities (Bhorat et al., 2018; Mabunda et al., 2023; Sibiya et al., 2023).

It is recognised in the literature that MSMEs could be part of a solution to South Africa's economic challenges and could contribute to achieving the NDP's target of a 5.4% annual economic growth rate (Wiid & Cant, 2018). As a result, significant attention and initiatives have been directed at MSME-related policy, as MSMEs are pivotal engines of economic growth and job creation. Public–private partnerships offer mentorships, funding and market access and the following policies and interventions demonstrate the targeted efforts being made to enhance competitiveness and access to resources for MSMEs in underserved areas:

- The National Small Business Act;
- The National Development Plan (NDP);
- The Integrated Small Enterprise Development Strategy;
- The Township and Rural Entrepreneurship Programme (TREP); and
- Support through special economic zones (SEZs) and industrial parks.

The effectiveness of interventions aimed at supporting MSMEs in South Africa has been the subject of considerable debate. Critics argue that many interventions suffer from inadequate implementation, a lack of coordination and insufficient monitoring and evaluation mechanisms (Mhlongo & Daya, 2023). Many programmes offer short-term financial relief but do not resolve the underlying structural challenges such as market access and business sustainability (Guloba et al., 2021). In addition, the one-size-fits-all approach, often employed in these interventions, does not account for the diverse needs of different types of MSME – which range from survivalist enterprises to medium-sized businesses. As a result, there is a growing call for a more rigorous assessment of these interventions to ensure that they contribute effectively to MSME growth and job creation (Tlou, 2017).

Methodology

The research began with a contextual analysis and profile of each site – Atlantis, Mandeni, Katlehong and Mamelodi – that was developed through an extensive desktop literature review. This contextual analysis offered an overview of the economic, social and environmental

dynamics and challenges that framed the broader analysis. The contextual analysis also involved extensive stakeholder mapping and supported the development of the research tools and the fieldwork plan.

The study investigated:

- The IRM services that are required by communities;
- The way in which these IRM services are secured;
- Which services are difficult to find in the local community; and
- Whether there are alternatives.

It also examined the types of qualifications and costs that are required to contract IRM services.

The key stakeholders identified are indicated in Table 1, with the table presenting the different stakeholder groups central to this research and indicating why they were selected.

TABLE 1: Stakeholder groups and purpose for engagement

STAKEHOLDER GROUP	PURPOSE IN THE ECOSYSTEM
Users of IRM (households, industry and business, public sector)	• Understand types of IRM service needed. • Identify required skills and qualifications. • Explore challenges in accessing services and skills.
IRM MSME providers	• Assess local MSME providers' role in the IRM economy and their access to work in public and private sectors. • Identify support required for growth. • Understand qualifications, skills acquisition and workforce sourcing and training challenges.
Strategic partners and MSME support providers	• Understand IRM skills demand, opportunities and challenges. • Identify support provided to MSMEs for local economic and skills development.
Education and training providers	• Gather information on IRM programmes (target audience, duration, qualifications, challenges). • Investigate work-based IRM training in industry, business and the public sector.
IRM learners	• Understand youths' goals and aspirations in IRM. • Explore how IRM-trained graduates can become economically active and set up MSMEs.

Source: Authors' analysis

The data were collected through interviews, a survey and focus-group discussions. One hundred and sixty-two stakeholders were interviewed; they comprised education providers, large companies, IRM MSME providers, strategic partners such as non-governmental organisations (NGOs), the provincial government and the local municipality. Furthermore,

10 909 IRM users were surveyed, including households, local government departments and informal businesses as users of IRM. Five focus-group discussions were held with Grade 11 and 12 learners and unemployed youths, during which information was gathered from 53 youth participants as potential entrants.

Snapshot of key findings: Cross-case analysis

As indicated, the skills ecosystem mapping sought to use the Spours (2019; 2024) skills ecosystem model to understand the opportunities and challenges in local IRM-related skills ecosystems. Using this lens, we were able to explore the wider context in which the IRM initiative is being implemented. We found that the success of the IRM initiative rests on a strong, evolving skills ecosystem with sustainable MSMEs.

Facilitating vertical factors and structures

As the skills ecosystem model suggests, the state plays a catalytic role through infrastructure spending, market regulation and education. Our research examined these vertical factors across the four case study sites (Spours 2019; 2024).

The literature indicates that, in order to create an environment that is conducive to MSMEs being involved in economic activities, provincial and local governments need to support the key enabling factors. These include:

- Providing an adequate infrastructure;
- Regulatory systems;
- Support and training programmes; and
- The mobilisation of public- and private-sector budgets to channel funds towards sustainable local development.

It is important that industrial policy promote labour-intensive industries and services and the provision of necessities, as they have the potential to expand customer demand for MSMEs. MSMEs cannot enter the supply chain easily in the capital-intensive mining, commercial farming or manufacturing sectors (Bureau for Economic Research (BER), 2016).

Our research across the four cases indicated that provincial and local governments have their own distinct economic programme initiatives and projects. These are derived from provincial and municipal agencies such as the:

- Western Cape government's Infrastructure Framework;
- City of Cape Town's Integrated Development Plan;
- Gauteng Industrial Development Zone Company;
- Ekurhuleni Community Enterprise Development Fund;
- City of Tshwane's Comprehensive Integrated Transport Plan;

- Mamelodi Framework for the Upgrading and Provision of Services;
- KZN Business Initiative; and
- iLembe Chamber of Commerce, Industry and Tourism.

These initiatives reflect a strategic multifaceted approach to promoting and supporting regional and local economic development, local employment, better infrastructure and MSMEs.

The four sites are located near major national economic projects known as special economic zones (SEZs). These SEZs are intended to act as external catalysts to attract investment and to stimulate regional or local economic development. The SEZs have the potential to stimulate economic activity beyond their immediate boundaries by offering investors incentives, a structured governance framework and institutional support. However, their success in stimulating economic activity remains constrained by infrastructure challenges, inconsistent government investment and policy misalignment.

The Atlantis SEZ benefits from its proximity to Cape Town, South Africa's second-largest city; and with its planned green manufacturing hub it already hosts several industrial plants. Given its national economic significance, the Atlantis SEZ is positioned to generate employment opportunities and to enhance local economic participation.

Similarly, the Tshwane Automotive (TA) SEZ presents promising prospects for Mamelodi, having attracted significant investments from companies such as Ford and its supply chain.

Meanwhile, the OR Tambo International Airport (ORTIA) SEZ has been in development for decades but has only recently gained momentum. Despite its strategic location in a major business hub, the ORTIA SEZ has yet to deliver the anticipated economic benefits to surrounding communities such as Katlehong.

The Mandeni region, near the iSithebe industrial estate, lies approximately one hour's drive from the Richards Bay (RB) SEZ but it falls within a different district. Like ORTIA, the RB SEZ has struggled to move beyond its initial phase, which has limited its economic expansion into both urban and rural areas.

Despite the potential of these SEZs, sluggish national and provincial investment in critical infrastructure and inadequate business incentives have hindered their effectiveness in driving skills development and small business growth.

The skills ecosystem mapping revealed significant constraints in the skills ecosystem. There are business environment and infrastructural challenges that have a direct impact on MSMEs, even those operating in SEZs. Stakeholders expressed serious concerns about inadequate service provision, including poor infrastructure maintenance and slow development. These limit business growth and consequently the demand for skilled workers. Such challenges are

compounded by a broader, depressed economic environment, which restricts business expansion and weakens job creation opportunities.

Poor infrastructure further disrupts the skills ecosystem by creating an unstable operating environment for businesses. For example, non-functioning street lights make it less safe for customers and businesses to transact in the evening. Poorly managed public environments – including those in business areas – can negatively affect business prospects.

The policy environment, particularly in the area of municipal service delivery, plays a crucial role in shaping these conditions. In the 2023/2024 financial year, the four municipalities' planned expenditure on repairs and maintenance varied significantly:

- Mandeni was allocated R19.9 million;
- Tshwane R974.5 million;
- Ekurhuleni R2.6 billion; and
- Cape Town R5.5 billion.

Of these, only Cape Town's allocation approached the 8% benchmark for maintenance relative to total operational expenditure. As at the third quarter of the 2023/2024 financial year, the other three municipalities lagged behind their expenditure targets (National Treasury, 2023). This underperformance in infrastructure investment constrains business growth, limits the development of a resilient skills ecosystem and weakens the facilitating verticalities necessary for MSME sustainability.

Another challenge for many small businesses is the fluctuating demand from provincial and municipal governments, which can render their work inconsistent and, at times, unsustainable. Government agencies often rotate MSMEs in and out of contracts and source different contractors from various local areas for different projects. As a result, MSMEs may secure work for one year but then go without another contract for several years, which can be discouraging, even for high-performing businesses. While this system can help to broaden access to government contracts, it also creates instability, rendering it difficult for MSMEs to build long-term sustainability.

Reflection: Facilitating vertical factors and structures

The analysis of the vertical structures across the four case study sites reveals how power dynamics shape the skills ecosystem and determine the extent to which MSMEs can meaningfully participate in local economies. Spours (2019; 2024) emphasises the catalytic role of the state in facilitating an enabling environment through infrastructure investment, regulatory alignment and support for training and research. Yet our findings suggest that this catalytic potential is often undermined by fragmented governance, uneven state capacity and a lack of alignment between national, provincial and local development strategies.

Power dynamics are especially visible in the way that provincial and municipal governments exercise procurement power. Although rotating contracts across multiple MSMEs is intended to democratise the process and to increase access for many MSMEs, firms with greater capacity and capital are more likely to win contracts and are often better positioned to meet the accreditation requirements. This reinforces the structural imbalances and limits upward mobility for smaller enterprises. Similarly, public infrastructure budgets, although critical to shaping an enabling environment, are not equitably distributed.

Regarding the concept of adaptive feedback, there is little evidence that local and provincial governments are systematically learning from implementation bottlenecks or MSME experiences. For example, the mismatch between SEZ policy intent and on-the-ground impact in places such as ORTIA and Richards Bay points to a failure to adjust strategies in response to observed constraints. Instead of creating virtuous cycles of investment, employment and skills upgrading, SEZs remain underutilised due to insufficient infrastructure, misaligned policies and unresponsive governance mechanisms. This lack of adaptive governance compromises the role of SEZs as engines of inclusive regional growth.

The concept of nested implementation, where national, provincial and local strategies are aligned and reinforce one another, is also not fully realised. Although each municipality or province has its own economic development plan or industrial initiative, these do not always connect to broader national objectives or to the needs of surrounding communities. For instance, although Atlantis and Mamelodi benefit from their proximity to active SEZs, the spillover effects on MSMEs are limited because of policy misalignment and infrastructure bottlenecks. This disconnection highlights the absence of an integrated multi-scalar governance model that is capable of coordinating investments and initiatives across institutional boundaries.

Collaborative horizontalities: Learning networks

Spours (2019; 2024) conceptualises the horizontal terrain as a multi-layered interlocking set of subsystems that produce inclusive economic and social growth in particular local environments.

The literature on MSMEs reveals significant barriers that undermine the resilience and sustainability of existing and emerging IRM-related MSME service providers. These include:

- A lack of entrepreneurial leadership skills;
- A lack of financial resources and/or finances;
- Limited financial education;
- Infrastructure constraints;
- A lack of training;
- A lack of technology; and
- Crime and corruption (Mhlongo & Daya, 2023).

Similar challenges were identified by MSMEs across the four sites. The following were pinpointed as the most prominent challenges: inadequate support from local government for IRM service demand, loans, assets, infrastructure, technology, equipment and tools, electricity supply and transparency; and, from big business, for start-up capital from banks, and IRM service competition versus partnerships and mentorships. In addition, the generally poor economic situation of townships and difficult access to dynamic urban areas make it difficult for MSMEs to expand their client base. Furthermore, there are also limited differentiated training programmes to help MSMEs to formalise, diversify and supply quality IRM services as they move upwards in the value chain. Other problems identified were restricted digital marketing strategies, corruption and late payments – all of which restrict the functioning of the skills ecosystem.

The skills ecosystem mapping also revealed another set of challenges related to the extent and nature of the demand for IRM. Sluggish economic growth with little real wage growth diminishes the purchasing power of many township residents, especially those without formal employment. This negatively affects the demand for IRM services and limits the client base of MSMEs; and it has a greater impact on those in poor townships than on those with access to a growing economy. MSMEs in the Atlantis suburb close to its industrial park and Cape Town were best placed to access clients. Katlehong and Mamelodi are not too distant from the Johannesburg and Pretoria economic hubs, respectively. However, those in Mandeni are at a greater distance from a large township and from a nearby developing urban economy despite there being a few large businesses (e.g. SAPPI) in the vicinity.

In the horizontal terrain, we assessed the demand for IRM services plus the demand for IRM skills and the IRM skills supply in all four case studies.

Understanding the demand for installation repair maintenance services

The skills ecosystem mapping found that the IRM demand varies greatly between stakeholders. Different types of employer and different types of IRM user, such as households and municipalities, require a mixture of personnel, from the highly skilled to the middle- to lower-level skilled. The demand for skills may be more or less labour-intensive and require different kinds of qualification to cater for the different levels of complexity and specialisation of tasks and activities, which can broadly be illustrated by Figure 2.

The horizontal axis of the diagram represents the continuum between the current reality of IRM services, where they service the formal and informal household market (on the left), compared with the desired state (on the right), where they would have formal contracts with government institutions and corporates.

There is also a differentiated IRM demand from different stakeholders for different IRM service providers, which can broadly be illustrated by Figure 3.

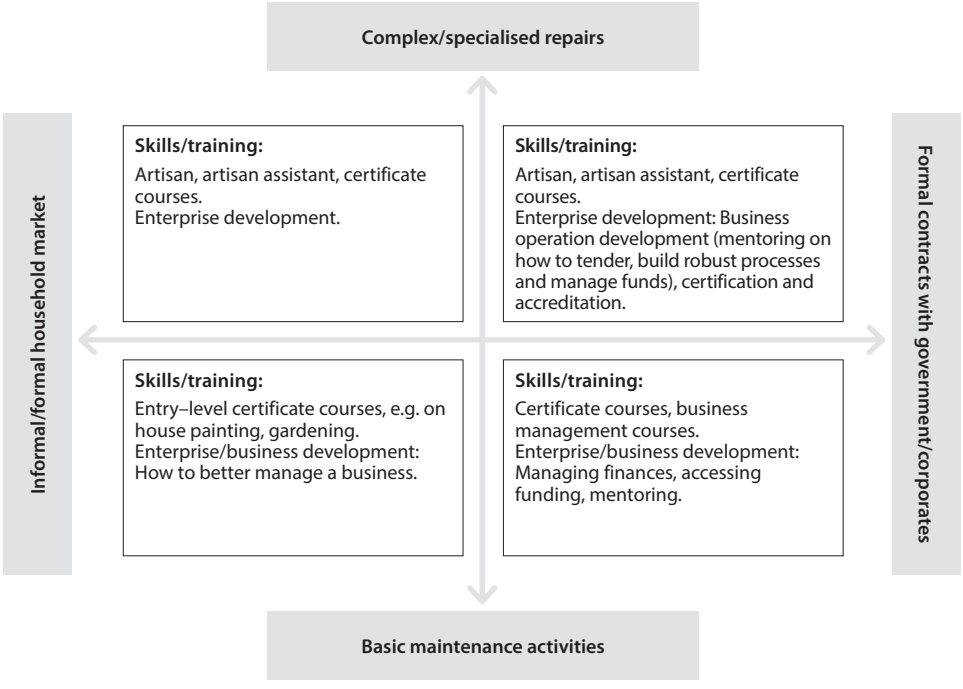

FIGURE 2: Different IRM services with various levels of skills demanded by different stakeholders

Source: Authors' analysis

The horizontal axis of the diagram represents the continuum between the current reality of IRM services in comparison with the desired state.

The demand for diversified IRM services from government and business can become significant, even if at times uncertain, if economic development takes place nearby; this is especially the case in the economic hubs of Atlantis and the Johannesburg and Pretoria regions. Big to medium-sized businesses require high- to middle-skilled personnel from established, qualified businesses for complex IRM work, such as machine-specialised maintenance and repair. There is less need for lower-skilled work such as basic painting, plumbing and repairs from lower-skilled IRM enterprises, including informal MSMEs. At the four sites, unfortunately, many large businesses use MSMEs only when they are accredited and have the financial and resource capacities to deliver what they consider good-quality services. This does not exist on a significant scale and is exacerbated by unfair competition from larger businesses that also supply IRM services related to the maintenance and repair of machinery and equipment.

Provincial and local governments at the four sites require a range of capital- and labour-intensive IRM services that rely on high-, middle- and low-skilled IRM personnel and technology such as industrial plumbing, machine repair, basic painting, plumbing, repairs

and weeding. These could unlock a greater and more diversified IRM demand if such entities could improve their service. Although 8% of municipalities' operational budget is allocated to repairs and maintenance, they often make uninformed decisions about their budget and priorities.

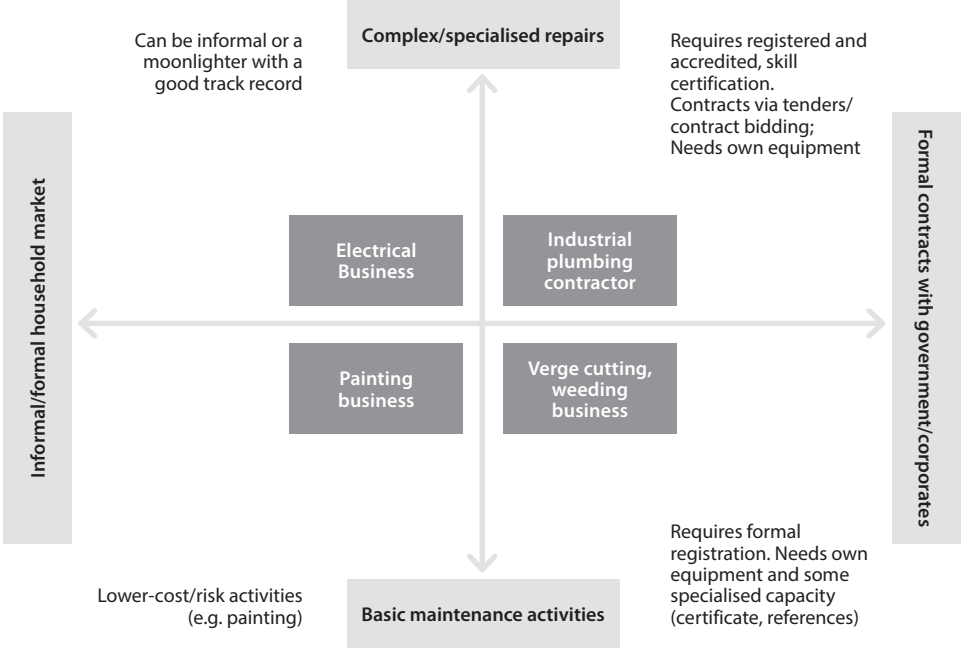

FIGURE 3: Different IRM services required by various stakeholders from different service providers

Source: Authors' analysis

At the other end of the IRM services' demand, informal businesses and township households require mostly lower-skilled work which can be met by entry-level survivalist MSMEs. Unfortunately, the demand for IRM services such as mechanical, electrical and plumbing services, and home-appliance and vehicle repairs and maintenance, remains relatively limited at the four sites. This is a result of poor township economic conditions, high levels of unemployment, meagre purchasing power and a reluctance to prioritise IRM tasks. These local factors, which are worse in Mandeni and better in Atlantis, place some MSMEs at risk of failure.

Moreover, market fluidity for IRM services makes it difficult to predict demand from one year to another, compelling MSMEs to search for new opportunities. However, some MSMEs may close if they find better business areas or formal employment. The four case studies point to a potential demand for diversified IRM services that could help some MSMEs to move up the value chain and satisfy some of the demand for medium- to high-skilled IRM services. This will possibly create an IRM skills pathway and promote the expansion of MSMEs.

Skills implications of the installation repair maintenance demand

The greatest labour shortage, related to meeting the needs of the technological evolution and its fast-changing skills ecosystem, is at the high- to middle-skilled level. With its green manufacturing hub status, the Atlantis SEZ requires artisans and technicians in the new renewable energy sector, whereas the TA SEZ requires engineers or technicians with high- to middle-level qualifications in the mechanical and electrical, chemical, civil construction and industrial fields. Artisans in plumbing, bricklaying and welding, and turner machinists, are also in demand in this automotive hub.

The ORTIA SEZ requires qualified electricians, mechanics, welders, and electronics and appliance repairers for the export-oriented, high-value-added and low-mass-production industries. This SEZ aims at the high-end skills in the processing, packaging and export of fresh food products, medicines, advanced component manufacturing, tertiary metals processing, minerals beneficiation, and jewellery and diamond manufacturing. The regional and local economic development around Johannesburg and Pretoria requires a range of high- to middle- to low-skilled personnel. In contrast, the less developed and more rural region of Mandeni needs less-qualified electricians, mechanics, engineers, technicians and supervisors to service the iSithebe industrial estate. To satisfy part of the more sophisticated IRM demand, MSMEs require formal accreditation as businesses with verified technical and business skills and competencies and a track record of work. However, there is also a demand for IRM skills for middle- to low-skilled personnel, especially, but not exclusively, from the township for mechanical and electrical services; home appliance and vehicle repair, and maintenance services; and also welding, plumbing, upholstery, cleaning and handyperson services. This demand can more easily be satisfied by MSMEs with the appropriate expertise rather than those with high-level qualifications, technology or equipment.

Given this diversified demand for IRM skills, different developmental and support processes need to be identified and designed to promote different kinds of MSME. There may be MSMEs that want to diversify and provide higher-order IRM skills and more complex work but which are struggling with, for example, accreditation and the qualifications required to move up the value chain. In addition, support is needed for entry-level MSMEs or those that are struggling to establish themselves and survive in the lower-order IRM work. Some MSMEs may fall into both of these categories.

Although the shortage of high- to middle-level skills is often mentioned, it is difficult to establish the breakdown of the skills in demand per sector or field, especially with future economic development being uncertain. Reliable skills audits do not exist in many sectors, whether from industry associations or from the Mechanical, Engineering and Related Services Sector Education and Training Authority (MerSETA). No adequate systems have been designed to anticipate skills requirements so that skills demand can adequately match skills supply. This highlights the need for SETAs to be better equipped to devise skills development plans and to be more involved in developing such plans for the different economic sectors.

Installation repair maintenance skills supply in the skills ecosystems

A number of post-secondary institutions, government agencies and NGOs exist at the four sites:

- Universities and universities of technology supply skilled engineers and technicians for the IRM sector and conduct research for socio-economic projects.
- TVET colleges are critical, producing middle-skilled graduates for MSMEs in the IRM sector. However, they face challenges such as underfunding, poorly qualified staff and outdated equipment, which hinders their ability to meet industry needs. Many training programmes lack the required quality and relevance to the labour market. While some colleges, especially those in Atlantis and Mandeni, have partnerships with businesses for WIL, students often report experiencing inadequate learning experiences. Employers prefer to supplement TVET graduates' skills with in-house training or to outsource specialised IRM work. The TVETs themselves need institutional capacity-building and better planning for demand-driven skills, led by employers and industry associations.

There are, however, a number of challenges:

- A key challenge is the focus on technical subjects over broader (and softer) skills such as problem-solving, critical thinking and communication, which are essential to success in the IRM sector.
- The TVET colleges face systemic challenges, including insufficient resources to upskill lecturers and update curricula, technology and equipment. Effective collaboration between education providers and businesses is therefore needed and this requires a commitment from institutional leadership.
- Short courses offered by TVETs, government agencies and NGOs are often too brief to provide adequate training for employment or entrepreneurship. Entrepreneurs need mentorship and ongoing support to develop their businesses, including accreditation, which many MSMEs struggle to obtain.

The reliance on post-secondary institutions varies across the sites. Atlantis depends on universities for research and skilled labour in green manufacturing, while the Tshwane and OR Tambo hubs require high-end engineering and technical skills for automotive and advanced component manufacturing. Mamelodi and Katlehong focus on universities of technology and TVET colleges for middle-level skills and Mandeni relies on TVETs, government agencies and NGOs for urban and rural development skills.

Reflection on the horizontal connectivities: Learning networks

Spours (2019; 2024) states that social ecosystems function optimally when this horizontal dimension is dominant, encouraging an open civil society terrain that promotes collaborative

social activity. In this context, collaboration involves the sharing of resources, knowledge and best practices, which can significantly enhance the capacity of MSMEs to respond effectively to market demands. However, the skills ecosystem mapping in Atlantis, Mandeni, Katlehong and Mamelodi revealed significant challenges that undermine these horizontal connectivities and the resilience of MSMEs.

First, MSMEs often lack the leverage to negotiate fair contract terms or secure long-term partnerships, particularly in those sectors dominated by large enterprises. This dynamic reinforces a dependency model where MSMEs are recipients of top-down support rather than co-creators in shaping local economic futures. Second, TVET colleges and NGOs often operate on the periphery of decision-making spaces, despite being crucial in shaping the skills supply. Finally, the four cases show that nested implementation is limited. For instance, SEZs require highly skilled IRM personnel, but local MSMEs remain under-supported in transitioning into these value chains. Moreover, institutions such as the SETAs, local governments and training providers work in silos, which practice prevents the emergence of integrated pathways for MSME development. This weakens the capacity of the skills ecosystem to act collectively and respond strategically.

Mediating factors within the skills ecosystem

In the Spours (2019) model of skills ecosystems, a 'common mission' is needed to ensure coherence between diverse social partners, each with their own specialisms and preoccupations. This requires mediation between the stakeholders. The role of 'ecosystem leadership' is to see the greater picture of the ecosystem, foster reflection and generative conversations, and to shift the focus from reactive problem-solving to co-creating the future (Spours, 2019).

The skills ecosystem mapping indicated that some alignment is needed between national, provincial and local policies and projects if MSMEs and local development are to enjoy better promotion. The financial assistance for, and the implementation of, these programmes should be monitored to assess who is included or excluded and what can be done to improve the strength and inclusiveness of such projects and programmes. It was not possible to establish whether these development projects, from different levels of government, have led de facto to closer vertical institutional collaboration and partnerships between these different levels.

At another level, the relationships between stakeholders can also play a pivotal role in shaping the dynamics and effectiveness of a skills ecosystem. Depending on the state of such relationships and the way in which stakeholders interact in providing IRM services and skills within the system, these can act as either enabling or constraining factors.

On this point, Atlantis and Mandeni appear to have enabling networks that bring organisations and people together to collaborate on past and present development projects, with some working better than others. The economic networks appear to be stronger in Atlantis because it has been targeted for economic growth, with a green manufacturing hub, for some time. In Ekurhuleni and Mandeni, several development organisations are contributing to the regional

and local economic growth, although on a smaller scale than in Atlantis. Examples of these include the Ekurhuleni Economic Development Department and its Community Enterprise Development Fund, the iLembe Chamber of Commerce, iLembe Enterprise and the iSithebe industrial estate. It was difficult to obtain an overall evaluation of the impact of these networks.

There are not many strong networks or forums for MSMEs to share their knowledge and learning, pool their resources and cooperate among themselves or with bigger businesses in order to access a greater number of market opportunities. We found that there are more active MSME networks and projects in Mandeni and Atlantis than there are in Mamelodi and Katlehong, for instance. Efforts must be made to minimise MSME competition and maximise their collaboration based on their comparative advantages, resources and expertise.

Although the relationships are stronger in Atlantis and Mandeni, there is a relatively loose relationship between businesses, government and skills development providers. But this, together with the uncertain economic future of the provinces and local regions, is insufficient to help with identifying the skills required in the future and how the supply of skills can be enhanced or increased.

Some partnerships are simply ineffective in promoting MSME development and local employment. Public- and private-sector incentives could serve to help large businesses and provincial and regional governments to develop better relationships with MSMEs. Moreover, incentives could encourage the public and private sectors to source more of their products and services through local IRM-related MSMEs and to offer effective assistance and mentorship while encouraging MSMEs to become formalised and compliant with various regulations.

In addition, it was found that the relationship between education and training institutions and MSMEs is also poor: the institutions do not focus sufficiently on the realities of operating as an MSME or on the working conditions of MSMEs. This needs to be taken into account when devising different institutional capacity-building programmes. Moreover, the hubs involved with MSMEs should be granted more government financial support and expert human resources for MSME training. In this regard, instead of a one-size-fits-all approach to training, training institutions should engage with different MSMEs to discuss their various concerns and needs; and then develop different forms of innovative upskilling and training programmes that will empower MSMEs to move up the value chain.

Local stakeholder hierarchies

Verticalities, state policies and regulations, and the horizontalities in the form of local collaborative networks do not function on equal terms for all stakeholders. MSMEs – particularly entry-level survivalist MSMEs – often lack the formal accreditation, verified technical and business skills, and track record that larger businesses and government agencies require for them to undertake complex IRM work. This structural requirement creates a hierarchy in which less-formalised or emerging MSMEs are marginalised from lucrative

contracts and are relegated to lower-skilled work for households or informal businesses. There are therefore not many strong networks or forums in which MSMEs are able to share their knowledge and learning, to pool their resources and to cooperate among themselves or with larger businesses. This lack of collective organisation and voice worsens their marginalisation and limits their ability to influence decision-making or to access larger market opportunities. In addition, the relationship between education and training institutions and MSMEs is also generally poor, as training institutions do not focus sufficiently on the realities and working conditions of MSMEs. This highlights the disconnection between the needs of the smaller, often informal, MSMEs and more formal educational power structures that do not prioritise the needs of smaller MSMEs.

Ultimately, these structural hierarchies, combined with the challenges of informality and poor economic conditions, marginalise MSMEs and severely limit their ability to influence the ecosystem.

Insights and recommendations drawn from the skills ecosystem mapping

The Spours (2019; 2024) model of skills ecosystem mapping was used to map the IRM skills in four South African townships: Atlantis, Mandeni, Katlehong and Mamelodi. The analysis revealed several insights regarding the collaboration, or lack of it, between the various stakeholders, the influence of policies and regulations, and the interaction points between these dimensions.

Vertical policies and regulations

The analysis shows that top-down policies and regulations play a significant role in shaping the skills ecosystem. Government initiatives aimed at supporting MSMEs, such as funding programmes and regulatory frameworks, can either enable or constrain the growth of an ecosystem. The regulatory landscape can either facilitate or hinder the operations of MSMEs. Policies that promote ease of doing business, reduce bureaucratic hurdles and provide clear guidelines for compliance can enhance an ecosystem's effectiveness.

Investment in improving the physical and digital infrastructure that supports MSMEs, including reliable access to utilities, transportation and Internet connectivity, could enhance their operational efficiency and competitiveness (Small Business Initiative (SBI), 2021; South African Institution of Civil Engineering (SAICE), 2022; Nthoana, 2024). While the rapid adoption of digital technologies is a global trend, in South Africa only half (52%) of the businesses in the entrepreneurship start-up stage plan to use digital technology to sell their goods and services. This is the lowest rate among developing economies (Bowmaker-Falconer & Meyer, 2022).

Another important factor to deal with is crime and corruption. These pose a significant threat to economic development and do not simply restrict the functioning of the skills ecosystem, but actively erode trust and resources, rendering sustainable growth exceptionally challenging

(Davidson et al., 2024). In support of this, recent reports indicate a rise in extortion practices targeting small businesses (South African Police Service (SAPS), 2024).

Access to funding is a critical factor in the sustainability of MSMEs. The skills ecosystem mapping reveals that the availability of financial resources, whether through government grants, loans or private-sector investments, has a direct impact on the ability of MSMEs either to succeed or to invest in skills development.

Recommendations to improve vertical policies accordingly include the facilitation of access to resources. Funding data show an increase in entrepreneurial activities and investment interests across different towns and provinces in South Africa (Davidson et al., 2024). Increased access to funding for MSMEs may be supported through innovative financing solutions such as e-commerce platforms. Moreover, providing training on writing business plans and financial management could increase the likelihood of funding applications being successful (SBI, 2021). In addition, government and private-sector initiatives should provide grants or subsidies for training and development.

Finally, the expectation that MSMEs will flourish near SEZs or benefit from public procurement ignores the structural challenges that many of these enterprises face. These challenges include limited access to finance, fluctuating work opportunities and the burden of navigating complex regulatory systems. These feasibility gaps must be acknowledged if policies are to move beyond mere rhetorical support and offer real developmental impact instead.

Horizontal collaboration

The skills ecosystem mapping exercise also highlighted the importance of collaboration among various stakeholders, including MSMEs, educational institutions, local government and industry associations. Effective communication and partnerships among these groups is essential to filling the skills gap and fostering a supportive environment for MSMEs.

Collaboration may facilitate the sharing of resources, knowledge and best practices, which could enhance the capacity of MSMEs to respond to market demands. For instance, educational institutions may align their curricula to the needs of local businesses, while MSMEs could provide feedback on the skills required in the workforce.

Creating networking opportunities and platforms for dialogue among stakeholders could strengthen relationships and foster a sense of community. This could lead to collaborative projects, mentorship programmes and joint initiatives that benefit the entire skills ecosystem.

Recommendations to improve horizontal collaboration include ongoing research and data collection. Comprehensive research is needed to gather reliable data on skills demand, market trends and the effectiveness of training programmes. These data could inform decision-making and help to tailor interventions to meet the needs of MSMEs more appropriately.

Education and training institutions should focus on the specific realities and working conditions of MSMEs so as to develop innovative upskilling and training programmes. Furthermore, partnerships between government bodies, the private sector and non-profit organisations are able to deliver targeted resources and expertise (Nthoana, 2024). What is more, mentorships and support for early-phase entrepreneurs are known to reduce failure rates (Makumbirofa, 2021). Mentorships, in particular, should help with recruiting and managing students who are entering the IRM pipeline with a desire to follow career pathways in this sector.

Mediation activities

The skills ecosystem mapping seems to indicate that mediation activities are the weakest domain in the IRM skills ecosystem. Greater collaboration between all stakeholders is needed to increase points of interaction between horizontal collaboration and vertical policies. These activities could include workshops, forums and collaborative projects that bring together stakeholders to discuss challenges, share insights and develop joint solutions.

The Spours (2024) model's emphasis on the dynamic and evolving nature of ecosystems provides a conceptual basis for discussing feedback loops and unintended consequences. The political economy–ecology perspective also stresses the immanent confluence of complex relations that can lead to diverse outcomes.

The effectiveness of interventions aimed at supporting MSMEs in South Africa has been a subject of considerable debate. Many interventions offer short-term financial relief but do not face the underlying structural issues such as market access and business sustainability head on. This is an example of an unintended consequence where interventions designed to help MSMEs fail to achieve long-term sustainability owing to a superficial approach and instead either create a cycle of dependency or result in failure.

The skills ecosystems mapping emphasises the importance of establishing feedback loops where MSMEs can communicate their needs and challenges to policymakers and local government. This interaction could lead to more responsive policies that are better aligned to the realities of the local economy. Ecosystem leadership is needed to engage with stakeholders and to ensure a comprehensive approach to responding to the needs of township economies (Nthoana, 2024). Mediation activities could also focus on capacity-building for both MSMEs and educational institutions. By facilitating training sessions, mentorship programmes and resource-sharing initiatives, stakeholders could work together to enhance the overall capabilities of the skills ecosystem.

What we learnt about the skills ecosystem mapping: value and limitations

The skills ecosystem mapping exercise revealed a number of important matters that must be attended to if the skills ecosystems are to promote the growth of the IRM sector in a meaningful manner: collaboration, continuous engagement, skills development, financial

and other support, the alignment of skills to local needs, and the easing of regulatory barriers being among them. These matters are elaborated on below.

Framework for collaboration

The skills ecosystem mapping revealed the relationships among MSMEs, educational institutions and local governments, highlighting the interconnectedness necessary to foster skills development and economic growth in the IRM sector. It provided a framework for collaboration, encouraging partnerships to deal with challenges such as skills mismatches and inadequate support structures. Insights from the skills ecosystem mapping could guide the development of policies that are better aligned with local economic realities and which ultimately support sustainable development and job creation.

Keeping skills ecosystem mapping dynamic

Skills ecosystems are dynamic and require continuous engagement to align with local economic needs. Spours and Grainger (2019) stress that skills ecosystem mapping is the first step in identifying problems, mapping existing relationships and assessing the potential of skills ecosystems. Collaborative networks of educational institutions, employers, government and civil society are essential to development, using open digital technologies for skills and to enable civic participation. Agencies, such as government departments, TVET colleges, universities, industry associations and NGOs, can assist in updating the mapping. A local anchor institution is needed to coordinate stakeholders and ensure that the mapping adapts to evolving economic conditions, skills demand and MSME landscapes. This process of ongoing evidence-driven skills ecosystem mapping is inherently complex and challenging, but the ultimate goal is to move towards 'inclusive, sustainable economic, social and educational development', which is an ongoing long-term project (Spours, 2024:2).

Limitations encountered in the skills ecosystem mapping

This research has limitations that may affect its comprehensiveness. Notably, it excluded interviews with municipal supply chain officials and those involved in interventions for people with disabilities, which could have provided valuable insights. A number of the participants struggled to provide precise quantitative data on funding and the impact of initiatives, leaving gaps in our understanding of the scale and effectiveness of support for MSMEs. Desktop research could not fully fill these gaps. In addition, the dynamic nature of skills ecosystems means mapping is subject to constant change, which limits its long-term applicability.

Conclusion

Our research emphasises that supporting MSMEs as important entities through which to grow local economies and foster more place-based skills development requires a comprehensive, multi-level approach to integrating skills development within the broader skills ecosystem.

This involves strengthening partnerships between TVET institutions and MSMEs, aligning training programmes with local economy needs, and improving access to capital, infrastructure and market visibility. Rigorous oversight and accountability mechanisms are critically needed to ensure that municipal budgets intended for infrastructure repairs and maintenance are fully utilised and that they achieve their intended impact, that is, directly supporting MSME operating environments and enhancing their market visibility.

Mapping the skills ecosystems in townships such as Atlantis, Mandeni, Katlehong and Mamelodi reveals the specific challenges and needs of local MSMEs. Our findings highlight the need for enhanced support structures, including increased capital, government procurement changes, and better marketing and management strategies. Resolving the skills mismatch and improving training quality through targeted programmes are crucial to the sustainability of MSMEs. The proposed recommendations are not easy fixes, but a coordinated effort by government, the private sector and educational institutions is necessary to create an enabling environment for growth, supported by rigorous impact evaluations and a bottom-up training approach. Achieving these recommendations will demand political will, sustained financial commitment and fundamental shifts in governance practices.

Based on Spours (2019; 2024), the skills ecosystem mapping exercise has shown that a successful IRM skills ecosystem relies on horizontal collaboration between stakeholders and vertical policies supporting MSME development. Strengthening these connections through effective mediation could lead to a more resilient skills ecosystem, one that contributes meaningfully to local economic growth.

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Optimising work-integrated learning environments at community colleges for adult education students

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ABSTRACT

This article evaluates urban and rural community colleges in the Eastern Cape, focusing on their suitability as placement sites for work-integrated learning (WIL) in the Diploma in Adult and Community Education and Training (Dip ACET). Grounded in a qualitative research design, the study employed document analysis, structured interviews and direct observations to assess practical learning conditions. Findings reveal significant disparities in institutional capacity and delivery between urban and rural colleges. The study argues that addressing these disparities requires targeted resource allocation, policy reform and sustainable partnerships. Such interventions are critical to strengthening rural community colleges and ensuring equity in WIL implementation. The article concludes that bridging these systemic gaps is essential for inclusive adult education and for realising South Africa's broader educational transformation goals.

KEYWORDS

Community colleges; adult education; student placements; educational quality; rural and urban disparities; strategic partnerships

Introduction and background

Globally, work-integrated learning (WIL) has become an essential component of higher education, as it complements theoretical knowledge with practical experiential learning (Raghubar, 2021). In the South African context, WIL is particularly crucial to programmes such as the Diploma in Adult and Community Education and Training (Dip ACET); these programmes aim to prepare educators to provide for educational needs in underserved and marginalised adult populations (Benavot et al., 2022). Community colleges, as defined by South Africa's White Paper for Post-School Education and Training (DHET, 2013), play a pivotal role in facilitating adult education. They provide accessible and contextually relevant learning opportunities for adults who have not completed formal schooling or who require additional skills training.

Community colleges in South Africa were established explicitly to deal with literacy, numeracy and vocational skills requirements and to provide broader socio-economic development among adults (DHET, 2013). Their purpose extends beyond conventional education and aims to foster social inclusion, community development and lifelong learning, particularly in historically disadvantaged communities (McGrath et al., 2020). However, while these policy intentions are commendable, the practical implementation of community college mandates has encountered numerous obstacles. Recent enrolment data reveal a significant decline in student numbers; this suggests that these institutions are not yet fully realising their potential, as envisaged in the national policy. According to DHET (2021), only 143 031 learners were registered at continuing education and training (CET) colleges, while more recent estimates by the Helen Suzman Foundation indicate a further decline to 124 638 learners in 2023/2024. These figures highlight a persistent gap between policy goals and actual practice in South Africa's adult education sector (DHET, 2021; Helen Suzman Foundation, 2024). Therefore, any discussion of WIL associated with community colleges must proceed from an awareness of these systemic challenges. These institutions serve as crucial environments in which Dip ACET students can engage practically and apply theoretical frameworks to real-world contexts (Mesuwini, 2021).

Despite the strategic importance and national policy emphasis placed on community colleges, significant disparities persist between the colleges situated in urban settings and those in rural settings in South Africa (Modise, 2023). Urban colleges typically benefit from better-funded infrastructure, superior resource allocation and access to more experienced education personnel, which renders them better suited to the effective implementation of WIL placements (Malale & Sentsho, 2014). However, rural community colleges frequently experience challenges related to inadequate infrastructure, limited staffing, resource constraints and logistical barriers. This has a significant impact on their operational effectiveness and their ability to support practical learning placements effectively (Muzeya & Julie, 2020; Whiteside, 2021).

The existing literature has dealt extensively with the broader implications of urban–rural educational disparities (Mzangwa, 2019; McKay, 2023). However, a notable gap remains regarding targeted evaluations of these disparities, specifically in the context of WIL

placements for Dip ACET students. This research responded to this gap by critically evaluating and comparing urban and rural community colleges' capacity to support practical, experiential learning placements effectively. It aimed to provide insights into optimising placement environments to enhance the quality and effectiveness of adult education and to ensure their alignment with both the national educational objectives and the specific practical learning needs of Dip ACET students.

Research aims and objectives

The primary aim of this study was to evaluate the suitability of community colleges in South Africa as placement sites for students enrolled in the Dip ACET programme in South African higher education institutions (HEI). Specifically, this study sought to:

1. Assess the alignment of college programmes with the practical learning needs of Dip ACET students;
2. Evaluate the availability and experience of staff and the adequacy of facilities and resources at these institutions;
3. Identify key disparities between the capacity of urban and rural colleges to provide supportive, safe and resource-rich learning environments; and
4. Propose targeted interventions and strategic partnerships to resolve the identified challenges, particularly in rural colleges, in order to enhance the overall quality of adult education in South Africa.

Literature review

Work-integrated learning in adult education

WIL is widely recognised as a crucial component of higher education, especially in vocational and professional training programmes. The concept of WIL merges theoretical knowledge with practical experience and enables students to apply classroom-based learning in real-world contexts (Raghubar, 2021). According to Mabungela and Mtiki (2024), WIL promotes deeper learning and enhances employability by equipping students with those essential skills required in professional practice. In the context of adult education, WIL is indispensable; it not only facilitates skills acquisition but also encourages the development of competencies that align with the evolving needs of adult learners. As postulated by Mabungela and Mtiki (2024), the importance of WIL has been reinforced in South Africa by national educational frameworks such as the National Qualifications Framework (NQF) and the Higher Education Qualifications Sub-Framework (HEQSF), which mandate the inclusion of WIL components in many academic programmes, including the Dip ACET (Council on Higher Education, 2011). This integration bridges the gap between theory and practice and enables students to gain hands-on experience in natural educational settings in which they can engage directly with other adult learners from diverse backgrounds.

Community colleges and their role in adult education

Community colleges in South Africa play a fundamental role in providing adult education, particularly in rural and underserved areas. These institutions were established to meet the needs of adult learners who may have missed formal schooling opportunities or who require further education to improve their employment prospects. The White Paper for Post-School Education and Training (DHET, 2013) emphasises that community colleges are integral to achieving the broader goals of the South African National Development Plan (NDP). This plan aims to improve adult literacy, foster skills development and promote lifelong learning (National Planning Commission (NPC), 2013). Community colleges cater to a wide demographic that includes marginalised groups, unemployed adults and those seeking skills-based education to enhance their employability. The strategic role of community colleges in adult education places them at the heart of WIL programmes for the Dip ACET, because they provide ideal environments for practical learning. However, research by McGrath et al. (2020) suggests that these institutions vary significantly regarding their infrastructure, resources and teaching quality. This affects the quality of the education they provide and their suitability as WIL placement sites.

Challenges in urban vs rural educational environments

The disparities between urban and rural education environments in South Africa have been well documented in the academic literature (Nkengbeza, 2017; Duma, 2021; Agumba, 2023; Right for Education, 2024) . Urban educational institutions, including community colleges, often benefit from better infrastructure, resource access and highly qualified staff (Whiteside, 2021). These advantages create conducive learning environments that foster student engagement and success. In contrast, rural institutions face numerous challenges, including inadequate infrastructure, limited access to educational materials and a shortage of qualified staff (Tapala et al., 2021; McKay, 2023). As pointed out by Mzangwa (2019), the South African government has recognised these disparities in the policies that are aimed at improving rural education, yet the gap between urban and rural institutions persists. In the context of adult education, rural community colleges are often hampered by logistical challenges such as poor transport infrastructure, which can hinder both student access and the availability of resources. Furthermore, rural institutions are more likely to face staffing shortages, which have an impact on the quality of instruction and limit professional development opportunities (Lopes & McKay, 2020). These challenges not only affect the day-to-day operations of rural colleges, but also directly influence their capacity to serve as WIL placement sites for Dip ACET students.

The existing literature, including work by Zenda (2024), indicates that rural institutions are often under-resourced, having inadequate teaching and learning materials, and they face significant challenges in ensuring student safety. This is particularly concerning for WIL placements, where students are expected to engage in practical teaching and learning activities in environments that support their professional development. Without adequate resources,

rural community colleges may struggle to provide the necessary support for student placements, which could adversely affect the quality of their learning experience (Rush-Marlowe, 2021).

Considerable research has been conducted on the challenges faced by South African educational institutions in both urban and rural contexts. However, there is a notable gap in the literature regarding the specific evaluation of WIL placements in community colleges, particularly for students enrolled in the Dip ACET programme. Much of the existing research focuses on the broader challenges of rural education or the role of community colleges in providing adult education. However, few studies provide a comparative analysis of these institutions' suitability for WIL placements. This study sought to bridge this gap by comprehensively evaluating both urban and rural community colleges in South Africa. The study focuses specifically on the needs of Dip ACET students and aims to provide insights into the way in which these institutions could better align their programmes, facilities and resources with the practical learning requirements of WIL placements. This research is timely, coming at a time when South Africa grapples with the challenge of improving the quality of education in rural areas. This will help to ensure that adult learners are taught the skills and receive the knowledge necessary to contribute to the country's economic and social development.

Methodology

Data collection was conducted through on-site visits, semi-structured interviews and document analysis. On-site visits were carried out at four community colleges: two urban (East London and Gqeberha (formerly Port Elizabeth)) and two rural. During each visit, observations were conducted for approximately two full days per site and they allowed for detailed assessments of the physical infrastructure, learning spaces and student–staff interactions. Semi-structured interviews were conducted with a total of 15 staff members. The sample comprised approximately three or four staff members per college, including one administrator, one or two lecturers and one support staff member at each institution. These participants were purposively selected to represent diverse functional roles and provide a holistic understanding of each institution's capacity to support WIL placements. Document analysis also included institutional placement policies, curriculum documents and internal reports on student support structures.

To illustrate the comparative design of the study and the methods applied in both urban and rural contexts, Figure 1 presents a synthesised framework of the participants involved and the data-collection strategies we employed across the four community colleges.

Figure 1 illustrates the comparative structure of WIL environments in two rural and two urban community colleges. Each institution engaged between three and four participants, including one administrator, one to two lecturers, and one support staff member. Data collection involved on-site visits over two days per college, observations of infrastructure and

learning processes, semi-structured interviews with 15 staff members across the four colleges and document analysis of placement policies, curriculum materials and institutional reports.

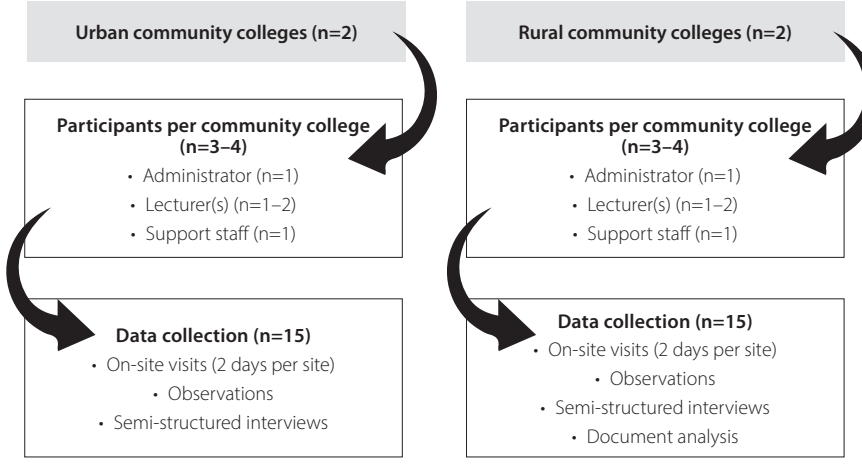

FIGURE 1: Comparative framework of participants and data collection across urban and rural community colleges

Source: Authors' own

Data-collection methods

Data collection was conducted through on-site visits, structured interviews and document analysis to ensure a comprehensive evaluation of the selected community colleges (Hatch, 2023). On-site visits to four community colleges – two urban and two rural – were conducted to gather direct observations of the institutional environments. These visits allowed for a detailed assessment of the physical infrastructure, available resources and general logistical arrangements to support student placements. The observations were structured to focus on how conducive the facilities were for practical learning, the educational materials and the interactions between staff and students (Farquhar et al., 2020).

In addition to on-site observations, semi-structured interviews were conducted with 15 staff members across the four colleges. These interviewees included vital personnel such as administrators, lecturers and support staff. They were designed to explore several core themes, including programme alignment with Dip ACET, the qualifications and availability of staff, resource constraints and student support mechanisms. Semi-structured interviews provided an opportunity to gather rich qualitative data and allowed staff members to discuss their experiences, challenges and perceptions of their college's capacity to host WIL placements (Priya, 2021). This method proved essential to understanding the operational realities of both urban and rural colleges in a way that quantitative methods would not have captured.

The third data-collection method involved document analysis, which focused on reviewing institutional records such as placement policies, curriculum outlines and strategic plans. The analysis of these documents provided a deeper understanding of the formal structures and frameworks governing WIL placements and shed light on the way in which each institution aligns its operations with the broader goals of the Dip ACET programme. This documentary evidence was instrumental in helping the researchers to understand how institutional policies interact with the practical implementation of WIL placements and how these frameworks influence student experiences.

Sample selection

The study's sample was purposively selected to ensure the representation of both urban and rural community colleges in the Eastern Cape in order to capture the unique educational context of adult learners (Hatch, 2023). Two urban community colleges, one in East London and one in Gqeberha, were chosen for their well-established infrastructure and resources that render them more likely to provide conducive environments for WIL. These urban colleges are critical reference points with which to assess the way in which resource-rich institutions handle student placements and whether their operational structures facilitate compelling learning experiences.

In contrast, two rural community colleges located in remote areas of the Eastern Cape were selected to explore the challenges that under-resourced institutions face. These rural colleges exhibit the typical logistical and infrastructural difficulties experienced by institutions in less-developed regions, including limited access to qualified staff, poor transportation networks and insufficient teaching resources.

This diverse sample made possible a more thorough comparative analysis of the ways in which different institutional contexts influence the capacity of colleges to support Dip ACET students.

Evaluation criteria

The evaluation of the community colleges was guided by specific qualitative criteria designed to assess the suitability of these institutions for WIL placements. One of the key criteria was programme relevance and alignment, which assessed the extent to which each college's curriculum and teaching practices matched the practical learning requirements of the Dip ACET programme. This criterion was particularly important in helping us to evaluate how well these institutions integrated adult education principles into their teaching and learning practices.

Another primary criterion was staff availability and expertise, which focused on whether the colleges have sufficiently qualified and experienced staff capable of providing WIL students with the necessary mentorship and guidance. Given that WIL relies heavily on practical

engagement and interaction with experienced practitioners, the availability of qualified staff was essential to implementing student placement successfully.

The adequacy of the facilities and resources was also a critical component of the evaluation and was examined to assess the quality and availability of the physical infrastructure, including classrooms, libraries and access to teaching materials.

The presence of student support mechanisms, such as academic advice, career counselling and health services, was another area of focus, as these support systems play a vital role in ensuring student well-being during placements. The capacity of each institution to provide timely feedback and evaluate student performance during placements was also assessed, as this feedback is critical to students' professional development. The analysis examined the ways in which these institutions managed logistical challenges, including transportation for students placed in rural areas and whether adequate safety measures were in place to protect students during their placements.

Data analysis

The data collected from the interviews, observations and document reviews were analysed using a thematic analysis approach (Gupta, 2024). This method involved coding and categorising the data to identify recurring themes across colleges. Thematic analysis was chosen because it allows for an in-depth exploration of qualitative data and provides insight into the underlying factors that influence the quality and suitability of WIL placements (Priya, 2021). Each interview transcript and observation note was carefully coded to extract critical themes related to programme relevance, staff experience, resource availability and logistical challenges. These themes were then compared across the different urban and rural institutional contexts in order to identify commonalities and divergences in the ways in which WIL is implemented. The comparative analysis highlighted significant disparities between urban and rural institutions, particularly in respect of infrastructure and staff support, which had a direct impact on the quality of the WIL placements. Moreover, a triangulation process was used to ensure the validity of the findings (Moon, 2019). This involved cross-referencing data from multiple sources, interviews, observations and documents to confirm the consistency of the results. Triangulation enhanced the study's credibility by providing multiple perspectives on the same issues to ensure that the findings accurately reflected the realities of the institutions under investigation (Moon, 2019).

Findings

The findings of this study provide an in-depth comparative analysis of the community colleges in the Eastern Cape, focusing on their suitability as placement sites for WIL students in the Dip ACET programme. Several key themes emerged through structured observations, interviews, and document analysis, highlighting significant disparities between urban and rural institutions. Figure 2 compares visually the key factors that influence the effectiveness

of WIL placements and illustrates the disparities between urban and rural community colleges across dimensions such as infrastructure quality, staff qualifications, resource availability, student readiness and logistical support.

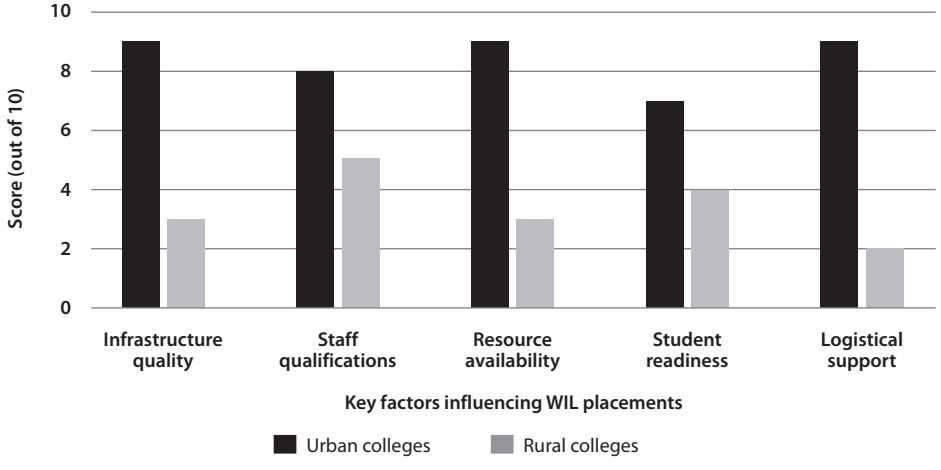

FIGURE 2: A visual comparison of key factors influencing the effectiveness of WIL placements

Source: Authors' analysis

This visual representation underscores how these multidimensional disparities cumulatively affect the quality of WIL placements and reinforces the need for targeted interventions to strengthen institutional capacity, particularly in under-resourced rural community colleges.

Figure 2 presents a comparative analysis of urban and rural community colleges across five critical dimensions: infrastructure quality, staff qualifications, resource availability, student readiness and logistical support. Scores are presented out of 10 per dimension for both urban and rural colleges.

Strong programme relevance and resource availability in urban colleges

The two urban community colleges, one each in East London and Gqeberha, were highly aligned with the practical learning needs of Dip ACET students. These institutions demonstrated strong programme relevance, with curricula that directly supported the principles of adult education and incorporated practical components that benefited WIL students. Staff members at these colleges were generally well qualified, with many lecturers possessing extensive experience in adult education and vocational training. Practical learning activities included supervised micro-teaching sessions where students delivered adult literacy modules, facilitated small-group vocational skills training and participated in community outreach projects such as agricultural extension demonstrations and health education workshops. For example, one urban college lecturer explained:

> I have been in adult education for 12 years now, both at community colleges and private training centres. This experience has helped me to adapt my teaching to adult learners who often come from complex educational backgrounds. [Lecturer 1]

Similarly, an administrator added:

> Our staff regularly attend DHET workshops on adult learner engagement, curriculum adaptation and competency-based assessments. [Administrator 2]

Such accounts illustrate the ways in which community colleges align with DHET priorities, ensuring that staff are equipped to respond effectively to the needs of adult learners through curriculum adaptation and assessment practices.

Infrastructure and resource disparities

Urban community colleges generally benefit from well-maintained facilities, functional classrooms, Internet access and reliable teaching equipment. In contrast, rural colleges often struggle with degraded infrastructure, limited or outdated teaching materials and insufficient technological resources. One rural participant explained:

> We often conduct our sessions in classrooms that have broken windows and no electricity. You cannot use projectors or any teaching aids; everything is done manually. [Participant R2]

This lack of infrastructure directly affects both teaching quality and student preparedness. Another urban student reflected:

> At our college, we had access to computers and a library. It helped a lot during our WIL because we could prepare properly and get support. [Participant U1]

Students' support structures and placement coordination

The urban colleges also had robust student support mechanisms, including academic advice, mental health services and career counselling. These support structures played a crucial role in ensuring student success during placements, as they provided students with the necessary guidance and assistance to navigate academic and personal challenges. Interview data revealed that staff at the urban colleges were proactive in offering feedback and evaluations to WIL students, which further enhanced their learning experience. An urban-based participant observed:

> Everything was planned for us; the college worked well with other organisations, including the university, and they gave us good orientation. We knew what was expected during WIL. [Participant U2]

However, one challenge identified at the urban colleges was the high student-to-teacher ratio, which occasionally limited the individual attention that WIL students received from their mentors. Nonetheless, this issue did not detract significantly from the overall quality of the WIL placements in these settings.

Rural institutions, in contrast, lack dedicated mentors or formalised support for their students One rural participant explained:

> We had to hit the ground running, as my mentor doesn't have a formal qualification in adult education, and sometimes he didn't relate well to adult education. There's no one to help you or check in on your progress. [Participant R4]

Rural colleges: Logistical challenges and limited resources

In stark contrast to their urban counterparts, the two rural community colleges faced significant challenges that affected their capacity to support Dip ACET placements. These challenges were primarily related to infrastructural deficiencies, resource constraints and logistical barriers. Observations at the rural colleges revealed that the facilities were often outdated and poorly maintained, with limited access to technology and insufficient classroom space. Rural students frequently encounter transport and accommodation barriers when accessing WIL placement sites, which are often situated far from their homes or colleges. Urban students, in contrast, generally benefit from their proximity to institutions and transport networks. One rural participant noted:

> I had to walk over 8 km daily to reach my placement site because there are no taxis in my area. Sometimes I'd miss days when it rained. [Participant R6]

This practical barrier severely limits student participation, performance and overall learning outcomes.

The absence of well-equipped libraries and computer laboratories also constrained the ability of students to engage in practical learning activities. Moreover, staff shortages were another significant problem at the rural colleges, where a lack of qualified adult education practitioners was prevalent. Interviews with staff members highlighted these colleges' difficulties in recruiting and retaining experienced educators, often due to their remote locations. As one rural lecturer noted:

> We often struggle to attract qualified adult educators because many prefer to work in urban areas where salaries, infrastructure and career growth opportunities are better.

An administrator echoed this concern, stating:

> In some years, we run classes with part-time facilitators who lack suitable formal qualifications, simply because we cannot currently recruit permanent staff.

This shortage of qualified staff directly affects the quality of WIL placements, as the students at rural colleges often lack adequate mentorship and support during their practical experiences.

Logistical transportation and student safety challenges were also identified as significant barriers at the rural colleges. Many students reported experiencing difficulty in accessing the colleges due to the poor road infrastructure and limited public transport options. In addition, safety concerns were raised by both students and staff, particularly those who had to travel long distances to reach the college. These challenges pose a significant threat to the success of WIL placements, because they create an environment of uncertainty and disruption for students. Despite these challenges, though, the rural colleges displayed a solid commitment to adult education, with staff members expressing a genuine dedication to supporting their students. However, the limited resources and infrastructural challenges faced by these institutions constrain their ability to provide the same support and practical learning opportunities as their urban counterparts.

Comparative analysis: Disparities and commonalities

The comparative analysis of urban and rural colleges highlighted significant disparities in the capacity of these institutions to support WIL placements. Urban colleges, with their superior resources, qualified staff and established support systems, are generally better equipped to provide conducive learning environments for Dip ACET students. These institutions offer well-structured programmes and access to essential learning materials to ensure that their students are able to engage fully in practical learning experiences.

In contrast, rural colleges struggle with infrastructural and logistical challenges that limit their ability to provide high-quality WIL placements. The lack of qualified staff, inadequate facilities and transportation challenges create an environment in which students face significant barriers to the successful engagement with the WIL placement. These systemic deficiencies are not unique; previous research has documented similar challenges in rural education settings, where infrastructural inequities and limited human capital hinder the implementation of experiential learning models (Wedekind & Mutereko, 2016; Papier, 2017). The study's findings suggest that targeted interventions are needed to resolve these challenges and to improve the capacity of rural colleges to support WIL. Strengthening staffing models, enhancing logistical support and fostering local industry partnerships have been recommended as essential strategies to enable equitable access to quality WIL (McGrath et al., 2021).

Discussion

The findings derived from this study provide valuable insights into the complexities of WIL placements in community colleges in the Eastern Cape, particularly as they relate to the Dip ACET programme. Figure 3 provides a visual comparative analysis of those key factors that influence the effectiveness of WIL placements and it illustrates the disparities between urban and rural community colleges across dimensions such as infrastructure quality, staff qualifications, resource availability, student readiness and logistical support.

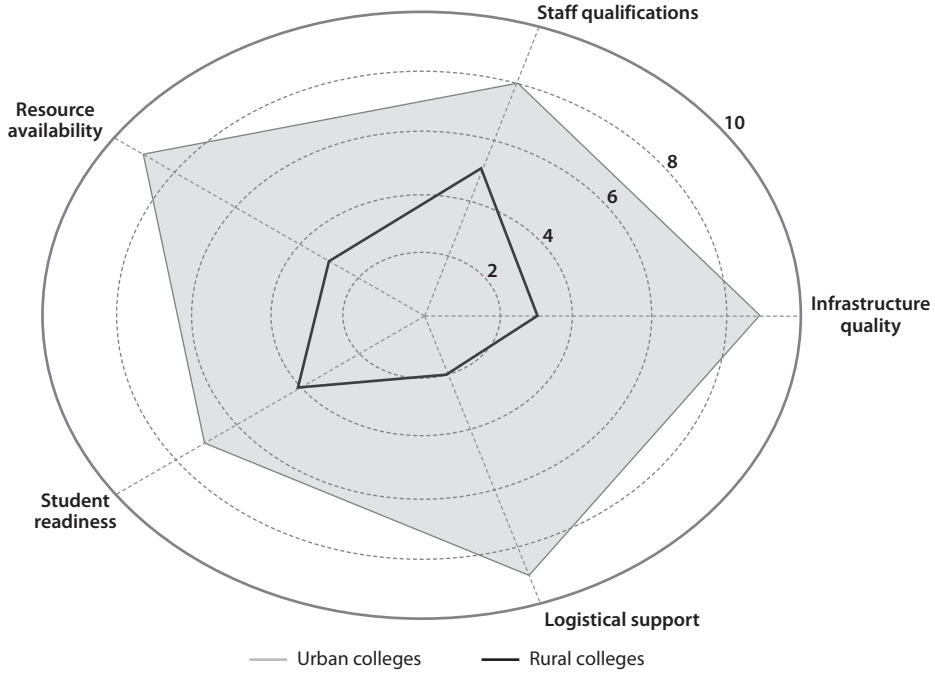

FIGURE 3: A visual comparative analysis of key findings influencing the effectiveness of WIL placements

Source: Authors' analysis

Figure 3 highlights how these interrelated factors contribute to persistent inequities in WIL experiences, emphasising the importance of comprehensive policy responses that resolve both structural and contextual challenges across urban and rural settings. The disparities between urban and rural community colleges highlight both the potential and the limitations of these institutions to support practical learning for adult education students. This section discusses the implications of these findings critically in the context of South Africa's broader educational landscape. It focuses on the urban–rural divide in adult education and the systemic challenges that need to be overcome to improve WIL placement experiences. To provide a concise visual synthesis of these observed disparities and institutional conditions, Table 1 presents a comparative summary of the capacity of urban and rural community colleges to support WIL placements.

TABLE 1: Comparative strengths and limitations of urban and rural community colleges in supporting WIL placements

DIMENSION	URBAN COLLEGES (STRENGTHS)	RURAL COLLEGES (LIMITATIONS)
Staff capacity	Appropriately qualified and dedicated personnel	Insufficient number of staff, not all appropriately qualified
Resources	Well–developed infrastructure; technology available	Poor infrastructure; limited technology available
Employer partnerships	Diverse opportunities for student placements	Limited opportunities for student placements

Source: Authors' analysis

As illustrated in Figure 4, urban institutions generally exhibit stronger structural, resource and staff capacities, whereas rural colleges continue to experience resource deficits, logistical barriers and safety concerns. This limits their ability to facilitate equitable WIL experiences effectively for adult education students.

Urban colleges: model for effective WIL placements

The findings suggest that urban community colleges in the Eastern Cape provide a strong model for effective WIL placements, primarily due to their better-resourced environments, experienced, qualified staff and robust support systems. Urban institutions can offer a learning environment that closely aligns with the needs of Dip ACET students and create opportunities for students to engage meaningfully in practical learning activities. These findings are consistent with research by Lembani et al. (2020) who identified urban educational institutions as being better equipped to deliver quality education owing to their access to resources and infrastructure.

The superior infrastructure and the availability of teaching resources in urban colleges reflect the broader socio-economic advantages that urban areas enjoy in South Africa (Altbach et al. 2019; Kajiita & Kang'ethe, 2024). These institutions are more likely to receive government and private-sector support, which enables them to deliver a high standard of education. For Dip ACET students, this translates into a conducive learning environment in which they can apply theoretical knowledge in practice, with access to technology, well-maintained classrooms and libraries that support their educational goals.

However, the urban colleges are not without their challenges. The high student-to-teacher ratios reported in the findings suggest that, even in resource-rich environments, students may struggle to obtain individual attention and mentorship. This challenge, while not as severe as the challenges faced by students at rural colleges, raises concerns about the sustainability of quality education in urban institutions, particularly as the demand for adult education continues to grow in South Africa's urban centres. As Molekwa (2024) argues, even well-resourced institutions must continually adapt to shifting educational needs and increasing

student populations to ensure they can maintain their quality standards. Despite these challenges, urban colleges represent a relatively successful model for WIL placements, one that could be replicated or adapted in other contexts, particularly in improving rural institutions through targeted interventions and resource allocation (Wyner, 2019).

Overcoming structural deficits of rural colleges

The stark contrast between urban and rural community colleges underscores the systemic inequities that exist within South Africa's educational landscape. The findings reveal that rural colleges in the Eastern Cape are hampered by infrastructural deficits, limited resources and significant logistical challenges, all of which severely limit their capacity to support WIL placements. These challenges are consistent with the findings of the broader literature on rural education in South Africa, where poor infrastructure, under-resourcing and teacher shortages have been found to be pervasive (Andreas, 2023; Rammbuda, 2023).

The lack of adequate facilities, such as modern classrooms and libraries, has a direct impact on the ability of Dip ACET students to engage in meaningful practical learning. Moreover, the shortage of suitably qualified staff further exacerbates the challenges, as students who are placed in rural colleges often do not receive the level of mentorship and guidance necessary for effective WIL. This aligns with the findings of Du Plessis and Mestry (2019), who noted that rural educational institutions frequently struggle to attract and retain qualified educators, largely due to poor working conditions and lower levels of investment in rural areas.

One of the most significant barriers identified in this study is the logistical challenge of accessing rural colleges. Poor road infrastructure and limited public transport options mean that students often face difficulties in simply getting to and from their placement sites (McKay, 2020). Furthermore, safety concerns, particularly for students travelling long distances, present additional risks that undermine the success of WIL placements. These logistical challenges are compounded by the geographic isolation of many rural communities, which further restricts access to educational materials, professional development opportunities for staff and external support from educational agencies or non-governmental organisations.

Resolving these challenges requires a multifaceted approach. Policy interventions that prioritise the development of the rural education infrastructure are critical. As reported in previous studies, the government acknowledges the need to improve rural schooling through targeted investment, but these efforts need to be expanded to include rural adult education institutions. Strategic partnerships between the government, private-sector stakeholders and civil society organisations could also overcome resource deficits and support rural community colleges in delivering higher-quality WIL experiences (Myende, 2019). Myende (2019) indicates that such partnerships could provide financial, technical and professional development support to bridge the gap between policy intentions and practical outcomes in rural education.

Implications for policy and practice

The findings of this study have significant implications for policy and practice in the field of adult education and WIL placements in South Africa. First and foremost, the disparities between urban and rural community colleges highlight the urgent need for targeted investment in rural education infrastructure (Showalter et al., 2019). We concur with Mgqwashu et al. (2020), who advise that the government's existing policies to improve rural education must be expanded to include community colleges. This is particularly important given the critical role that these institutions play in adult education and skills development. Strategic partnerships will be essential to bridging the resource gaps identified in rural colleges. Public–private partnerships and collaborations with international development agencies could provide the financial and technical resources needed to improve the infrastructure and provide staff training and student support services in rural community colleges (Matshidze, 2021). Furthermore, these partnerships could help to facilitate logistical support, such as improved transportation services, for students placed in remote areas.

In addition, policymakers should develop specific guidelines and support structures for WIL placements in rural settings. This is necessary to maximise the educational value of these placements and to ensure that students are adequately prepared to navigate the security and logistical constraints of such environments. Finally, while generally better resourced, urban colleges must resolve the challenges posed by high student-to-teacher ratios in order to maintain the quality of WIL placements (Patchappan, 2021). This could be achieved through the targeted recruitment of additional staff and the implementation of mentorship programmes that pair students with experienced educators to ensure that they receive the guidance needed for professional growth.

Limitations and areas for future research

While this study offers rich qualitative insights into the suitability of community colleges as WIL placement sites for Dip ACET students, certain limitations should be acknowledged. The research focused on a limited number of colleges – two urban and two rural – in the Eastern Cape, which restricts the generalisability of the findings across the national landscape. In addition, although the purposive sampling approach provided in-depth contextual data, it may not have captured the full diversity of the institutional challenges faced in other provinces. Future studies could broaden the sample across multiple regions and include private and satellite campuses to provide a more comprehensive national picture of community college readiness for WIL.

In addition, this study did not track the long-term professional development trajectories of students post-WIL. Understanding the sustained impact of placement experiences on graduates' employment outcomes, teaching philosophies and confidence to deliver adult education remains an important area for future research. Longitudinal studies, in particular, are necessary to assess whether WIL contributes meaningfully to the development of self-

directed learning, professional identity and community engagement among Dip ACET graduates. Researchers could also explore the ways in which institutions adapt their placement models over time in response to policy changes, technological advances or funding shifts. Such investigations would enrich the broader discourse on WIL as a transformative pedagogical strategy in adult and community education.

Conclusion

The findings of this study reaffirm the stark disparities between the capacity of urban and rural community colleges in the Eastern Cape to deliver equitable and pedagogically sound WIL experiences for students enrolled in the Dip ACET. Urban colleges, characterised by relatively stronger infrastructure, well-qualified staff and formalised support structures, are better positioned to facilitate high-impact WIL placements that reinforce theoretical learning with meaningful practice. These institutions are often located in areas with reliable transport, functional amenities and access to a network of placement partners, all of which contribute to enhancing the professional readiness of Dip ACET students.

In contrast, rural community colleges remain structurally marginalised, facing deficits in infrastructure, academic staffing, technological capacity and placement support systems. These limitations compromise the effectiveness of WIL for rural-based students and widen the educational equity gap. Resolving these challenges requires targeted policy interventions that include increased funding, rural staff development programmes and institutionally coordinated placement models. Moreover, multi-stakeholder partnerships between colleges, municipalities, non-governmental organisations and adult education service providers could provide practical mechanisms through which to improve placement conditions and outcomes. Ensuring that all students, regardless of their geographic location, have access to high-quality, contextually relevant WIL opportunities is essential to realising the broader goals of adult education transformation in South Africa. Ultimately, improving the functionality and inclusivity of WIL in the community college sector will be instrumental in equipping future adult educators with the competencies needed to advance social justice, lifelong learning and community empowerment.

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Governing technical and vocational education and training: Efficiency and accountability in the form and function of college councils

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ABSTRACT

The councils that govern technical and vocational education and training (TVET) colleges add a local layer of authority to the governance hierarchy of vocational education. The councils are made up of internal stakeholders and ministerial appointees and are meant to oversee the efficient and effective delivery of training and to provide accountability for college operations. This study investigated whether the form of this governance model matches its function. The study draws its findings from a survey of 300 council members in 48 colleges and from interviews with the principals, chairpersons and academic board representatives of nine colleges. Based on our findings, we argue that college councils have considerable responsibilities but that the structure, operational procedures and capacity of the councils are not sufficiently capable of carrying the weight of these responsibilities. This is evident in the confusing lines of accountability, from meetings that do not drive strategy and from a deficiency of industry experts serving on councils. Thus college councils add another layer of accountability to TVET colleges without necessarily contributing to their institutional development.

KEYWORDS

Technical and vocational education and training (TVET); college councils; governance; accountability

Introduction

The devolution of governance responsibilities of technical and vocational education and training (TVET) colleges from national and provincial level to local college councils has been an important policy lever in the changing landscape of the TVET sector. College councils have been tasked with a wide range of responsibilities that are intended to improve the accountability and efficiency of colleges. In this study, we examined what the policy suggests is meant by accountability and efficiency and we examine the implications of the decentralised system of governance for the form that councils take. We reviewed the extent to which college councils are able to fulfil their mandates under the current model and where their strengths and weaknesses lie. This study therefore investigates whether the form that TVET councils take aligns with their functions. A description of the form councils take includes their structure, operational procedures and capacity. Based on the principle that form should follow function, we chart the extent to which councils have an established form to support the development of colleges and the promotion of technical and vocational training.

The findings of this study are based on semi-structured interviews conducted with the principals, council chairpersons and academic deputy principals from nine TVET colleges. A total of 25 interviews were conducted via virtual platforms. A college in each province was selected to participate in the research and the research team tried to balance the selection of urban and rural colleges, large and small colleges, and those with positive and negative audit outcomes. Further interviews were also conducted with the Department of Higher Education and Training (DHET), the South African Public Colleges Organisation (SAPCO), the TVET Governance Council and the South African Further Education and Training Students Association (SAFETSA).

In addition, a survey was developed and distributed to the council members of 48 TVET colleges. Two of the colleges were under administration at the time of conducting the survey and the survey was not extended to them. The researchers received approximately 300 responses to the survey from council members, which is a response rate of 40%. Using a Likert scale, we requested council members to rate the effectiveness of council meetings, the perceived scale of corruption and the overall success of the council in achieving its legislated tasks.

The study also consolidated and analysed the self-evaluation forms that council members completed for DHET in the second half of 2023. Ninety-seven responses to this survey were received. This self-evaluation reviewed council performance in six dimensions:

- Leadership and oversight;
- Structures and relationships;
- Accountability;
- Compliance;
- Performance, and
- Meetings and communication.

The article begins with a review of the policy related to TVET governance and the rationale behind the form or model of governance. We then review whether councils have been effective in meeting their mandates before reporting on our research findings about the way in which councils' structures, operational models and capacity have developed. Given that form follows function, we argue that it is not sufficiently clear in the policy whether councils are primarily meant to serve as oversight of management and/or act as representatives of stakeholders and/or provide skills for the efficient implementation of vocational education. Although the legislation mandates councils to perform explicit tasks, such as approving strategic plans, it is in the implicit interpretation about which role players have the authority to make decisions and who is accountable to whom that disputes arise.

Functions of governing councils

The concept of governance refers to the oversight of the management and administration of institutions. The King IV Report on Corporate Governance (Institute of Directors in South Africa (IoDSA), 2016), which came into effect on 1 April 2017, describes corporate governance as being about the exercise of ethical and effective leadership of a governing body to achieve the governance outcomes of ethical culture, good performance, effective control and legitimacy. The tasks of a governance structure include that stakeholders:

- Have the information needed to evaluate an organisation's performance;
- Define its strategic goals;
- Ensure the integrity of the organisation's external reporting; and
- Adopt a stakeholder-inclusive approach that balances the interests of material stakeholders against the long-term best interests of the organisation (IoDSA, 2016:43–71).

While the King Reports (2016) on governance have been applied to public organisations, the transfer of principle, function and form from corporate to public institutions is not straightforward. Corporate governance usually has clear performance indicators regarding profit and a restricted hierarchy between management and the board; and external stakeholders have a limited influence on strategic decisions. However, the public sector operates in a more complex political environment, with a range of interest groups and multi-layered and cross-referential management structures. College councils are the governance structures at local level that are overseen by DHET but their decisions need to consider the requirements of a number of other statutory councils in the post-school sector, such as those responsible for regulating occupations. The outcomes of public institutions are not always technically measurable, such as by measuring profit, but they do include social, cultural and transformation outcomes. Moreover, decisions are, at least symbolically, subject to democratic principle. Peters (2001:22) explains that

> the tasks of governing [in the public sector] are almost inherently more difficult than the tasks of managing in the private sector, given the multiple goals, the

> constraints on action, and the demands for accountability that characterise the public sector.

It is because of the additional function of democratic accountability among a wide range of stakeholders that the form that governance has adopted in the TVET sector is one of decentralising responsibilities to college level. As Wedekind notes, an important concept for making sense of governance reforms is that of decentralisation (Wedekind, 2010:306).

The Continuing Education and Training (CET) Act 16 of 2006 gives college councils substantial autonomy from the national DHET. TVET institutions have the authority to draft strategic plans that include mission statements and funding goals; to respond to discrimination on the basis of race, gender and disability; and to develop safety measures. They are also tasked with determining a language policy and an admissions policy and with ensuring that all learning programmes offered at the college are accredited. In consultation with the Student Representative Council (SRC), the council determines and provides student support services. Councils are also permitted to appoint additional staff who are remunerated from funds raised by the college. Financial records must be kept and internal audits and risk management systems must be set up. Councils report to the Minister of DHET on the finances, the functioning of management, governance and the performance of students.

Greater decentralisation and autonomy of college councils is often interpreted positively. The two main benefits of decentralisation are efficiency and accountability, both of which contribute to the overall effectiveness of TVET institutions. As Mokoena (2020:11) points out: 'Councils do not only provide oversight and monitoring of executives, they also provide access to networks of resources and help steer the performance of the college'.

With regard to efficiency, the argument in favour of decentralisation is that it enables colleges to be nimbler and more responsive to local needs and to tailor their programmes to regional labour markets (Wedekind, 2010:306). Industry's presence on the councils in the form of donor representatives, for example, is to ensure that they are cooperating with colleges to create opportunities for in-service training and internships and to secure private-sector funding. Katsamunska (2016:139) points out that the concept 'good governance' is focused on 'the problem of how efficiently state institutions and regulatory environments operate and to be more neutral as to the role of the state and to what tasks the state undertakes directly'.

But a more critical interpretation of efficiency is that college councils ensure that colleges are aligned to business principles that do not suit the public-sector educational system (Needham, 2019). This is where the emphasis is on commercial or corporate efficiency rather than on cutting bureaucratic red tape or finding ways to work cooperatively. As Gleeson, Abbott and Hill (2011:786) point out,

> the post-modern ideal of distributed governance is little more than a reworking of the state's neo-liberal ambitions designed to exert greater central control of

> service delivery – through governance networks that favour market hegemony, at local level.

Although there is a loosening of the grip of control by central government, policies on the way in which colleges should deliver vocational education and training are still directed from the national level. Wedekind (2010:310) stated that, while there was a shift 'towards an "output" orientation in the governance policy […], "input" in the form of rules and regulations still dominated the governance model'. For example, further education and training (FET) colleges were never granted autonomy to develop their own programmes (Needham, 2019:91): the 'efficiency' directive in the system is top-down rather than bottom-up. And any gains in efficiency derive from how cost-effectively a college council can implement policy.

Another benefit of decentralisation is that it enhances accountability. A council contributes additional skills to ensure that a college runs efficiently and adheres to auditing protocols and transformation goals. However, the meaning of accountability and who holds councils to account is not clear. Although some of the council members are representatives of stakeholder groups, such as staff, students and donors, they are not required to account to their constituencies regarding policy or the way it is implemented. They are neutral arbiters of administrative-type duties. The minister is required to

> ensure broad public participation in the development of further education and training policy and the representation of stakeholders in the governance of all aspects of the further education and training system (Higher Education and Training Laws Amendment Act 25 of 2010 (section 41C(*m*)).

However, college councils are not the structures through which such consultation is mediated. Mbatha (2023:188) notes that there is 'a gap between the actual representation of group interests at the council level and the theoretical expectation of taking stakeholders' input into account in practice'.

College councils therefore have a communitarian basis because it is assumed that the representative members share a common vision for the college that is aligned with the national policy. Katsamunska (2016) points out that the 'good governance' model presumes that there is a pre-existing notion of the 'common good' or strategic intent among the participants in the governing structures. Without it, there may not be coherence in the system as a whole. Political differences are downplayed, as are differences of opinion on TVET. This makes the council model vulnerable 'if societal subsystems [are] immature in terms of solidarity and the search for common good' (Katsamunska, 2016:139). Where interest groups, or even individuals, have a self-interested intent, councils either become sites of conflict or are easily swayed to those members who are most persuasive or determined to see their advantage win out. As Katsamunska (2016:139) indicates, the 'good governance' model favours more active stakeholders.

It is possible to combine the different notions of efficiency with the different approaches to accountability and to arrive at very different models of the role of college councils. Where efficiency is implemented as a top-down, cost-cutting exercise matched with bottom-up accountability, and where the national government holds the college council to account, then governance at college level is little more than an administrative function. In such instances, the councils have negligible power to determine the implementation of vocational training.

Another combination is bottom-up efficiency, where the members of council determine which vocational programmes to implement and the way in which to do so. This is matched with top-down accountability, where the national department is accountable to the college council for support to implement council plans. In this instance, TVET councils have much greater authority to make changes in colleges.

In essence, the policy on TVET governance is not clear about the purpose of college councils. Although the policy sets out the tasks that councils are expected to perform, it is not clear about the intentions or objectives of those tasks. This article draws on our research to determine whether the form that councils take affects their functioning. In other words, are councils set up in ways that enhance their efficiency and accountability? Or do they operate on the premise that there is a shared vision of the common good for the college, or are there internecine conflicts that result from the composition of the council?

Effectiveness of councils

Assessments regarding how well TVET councils are performing are mixed, but concerns have been expressed that the governance of colleges is weak. Zungu and Munakandafa (2014:14) point out that the College Improvement Project (CIP) was initiated by DHET in 2011 because FET college councils were found to be 'dysfunctional' and did not provide 'strategic leadership and guidance in colleges'. The White Paper for Post-School Education and Training (PSET) (DHET, 2013) also highlighted problems of poor administration, financial and human resource management, and student support. The PSET White Paper (DHET, 2013:19) postulates that, in many colleges, the quality of leadership does not meet the required standard and that, while there are several exceptional colleges, the majority operate at a level that is below the required standard (DHET, 2013).

One indicator of good governance is financial oversight. An analysis of a sample of 28 college annual reports for 2021/2022 revealed that 40% of these did not include the required financial reporting attachments. Only 21% of colleges had an unqualified audit opinion. According to the Auditor-General, the majority of colleges had material misstatements in their reports and insufficient controls in financial processing and the reconciliation of financial transactions.

But there are also positive assessments of council performance. According to Badenhorst and Radile (2018:3), the governance system encourages autonomy. Mothapo (2014:40) argues that TVET governance was implemented in accordance with the criteria provided in the King II

Report (IoDSA, 2002), 'which places a strong emphasis on the value[s] of fairness, accountability, responsibility, and transparency'. In our survey of TVET college councillors, respondents were generally confident when asked about the effectiveness of college councils, with 'monitoring the performance of the academic programme' rated as being the most successful of council tasks. The 'introduction of new training programmes' was rated the lowest.

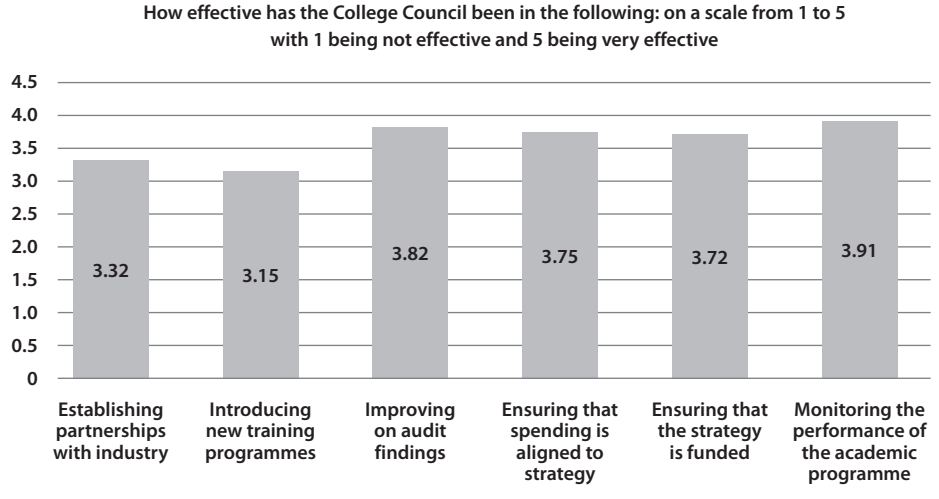

FIGURE 1: Effectiveness of college councils

Source: MAS survey (N = 294)

Form and function of TVET college councils

We have argued that TVET governance is decentralised to college council level, largely to improve the efficiency of policy implementation and to add another layer of accountability to the system. The functions of councils are stated in legislation (CET Act 16 of 2006). However, there is still room for interpretation of the purpose of TVET governance – whether the focus should be on accountability or efficiency – and the way in which these terms are understood. 'Efficiency' can be understood either as more effective implementation of policy or as cost-saving measures. 'Accountability' can be directed either to central government or to a variety of other stakeholders. In this article, we consider how the implicit rationale is expressed in the form that councils take. If form follows function, then the structure of councils, their working procedures (meetings) and the capacities of council members all need to be set up to achieve those goals. We are therefore interested in the way in which the interaction between the form and the function of councils provides us with an understanding of the implicit function of local TVET governance. Our findings also reveal some of the strengths and weaknesses of councils in carrying out their duties.

Structure of councils

Efficiency and accountability are structured into TVET governance in a number of ways. One way is for the councils to have a significant degree of autonomy from the national government. The assumption is that, without the encumbrance of bureaucracy and the red tape involved in seeking permission from national government, college councils can respond quickly to strategic needs as they arise. Accountability can also imply that, because college council members have direct contact with the colleges, they have a better knowledge of the activities in the college in order to hold management to account than national government would have. Whether or not college councils view themselves as accountable to the national department, to their colleges or to constituencies outside of colleges, such as employers – or as a body that balances accountability to all these stakeholders – can have an impact on the relationships between council members and affect the way in which they carry out their functions.

The interview respondents were generally satisfied with the current level of autonomy from national government. However, some council members asserted that councils should have more autonomy and power, especially over human resource matters, as illustrated by the following comments:

> We need more power. DHET is micromanaging TVETs. So, quality of people is very important. We want proper and qualified people.

> If the department could review delegations of authority in terms of recruitment of staff and allow principals to appoint staff up to the deputy principals, that would work. We are sitting with a high vacancy rate at colleges because of the centralised function in terms of appointment from assistant directors up to deputy principals, which is a huge problem for colleges. The department takes even three, four years to appoint at our college.

Although autonomy is meant to improve efficiency, there are still areas where centralised procedures and formalities are viewed by council members as stumbling blocks to the smooth running of the colleges. Council decisions are often dictated by templates and forms provided by DHET, which also has the power to dictate terms to colleges through funding allocations. For example, through the National Qualifications Framework (NQF) Act 67 of 2008, DHET broadly prescribes which occupational qualifications should be offered by colleges (DHET, 2021). These qualifications were developed to include work experience and they are therefore intended to be responsive to labour market needs. However, currently, only a small number of occupational qualifications have been funded by DHET.

Whereas councils appear to want greater autonomy from the national DHET to be able to make decisions about human resources and training programmes, they are accountable to the department for the overall performance of the TVET colleges. At the same time, the councils are given complicated and ambiguous authority over college management. Mothapo

(2014:74) points to a lack of clarity regarding the role of council members in relation to the role of executive management as a major shortcoming in good governance. He writes, 'there is a tendency on the part of some college councils to engage in micromanaging the institution, thus undermining the executive management team (EMT)' (Mothapo, 2014:74).

Principals report to DHET regarding their performance agreements and are held accountable by the council on matters and functions allocated to them by the council. A chairperson stated:

> Principals just listen to the department, not to the council. We cannot fire them; we cannot discipline them. The directors-general (DGs) at DHET are friends with them, and the issues do not get to the Minister.

Lines of accountability are unclear. One chairperson stated:

> Should the principal not be able to control and manage their deputies, you would have to take the matter to the regional office where the manager of the principal is sitting, and, should you fail in that, then you will have to approach the DG. This process is frustrating for someone who comes to the council meeting once a quarter and doesn't work for the organisation. Accordingly, this creates four phases of accountability before you get to someone who can make a final decision. The phases are the principal, regional office, DG of TVET, and, finally, the governance office within DHET.

A principal notes that there is confusion between corporate boards and councils. Council members with prior experience on boards expect councils to be the de facto employer. He explained:

> This is one of the issues that poses a challenge in running a college with the council that thinks they are the board members and should dictate what must happen instead of playing their oversight role in terms of the CET Act.

The tensions between councils and management run along disjointed lines of accountability and uncertainty about who has the final authority over colleges. Suspicion runs both ways. Council members indicate that management does not adequately implement their decisions or report appropriately. However, management holds the opinion that council members involve themselves in operational matters, trying to influence appointments and the awarding of tenders. According to a chairperson,

> [there is] resistance and pushback when enquiring about resources. There is a need to understand that governance is not interference but support. That is building trust between operations and governance.

While councils may view their role as keeping management accountable, management is as likely to consider the council to be a conduit for corruption:

> Some are in denial; they continue to interfere and micromanage the college. Some resigned because they realised that the latest council is not allowing that type of interference.
>
> People wanting to have their hands in the cookie jar, which is quite concerning, and them not being available to make any valuable contributions.
>
> Political organisations want to interfere with the running of the college. A business unit in one of our areas wanted to see us, because they were complaining that they see tenders and they're not even informed about that. They are the first people who need to be cared about and they wanted to be part of it.

Despite the above examples of relationship challenges, though, there is also positive feedback from approximately a third of the interviewees. Building relationships and trust between councils and management is a key requirement for ensuring that governance structures function. One principal stated,

> We are blessed with a chairperson of that nature who brings people together, but more important is the vision. If we have the chairperson of the council who shares the vision with the CEO, then we are blessed because you will share that vision in terms of execution, and you share the vision in terms of oversight. So you are speaking the same language. That's one thing. The other thing is [that] people with expertise in council is also key … . We are not talking about educated people. ... It's about culture, social cohesion, and the ability to work with others. So we have become an effective council because it indeed upholds the social cohesion that we talk about.

This case confirms Katsamunska's (2016) argument that the good-governance model assumes that stakeholders already agree on strategy and their role is to find the most efficient way to implement it. But, for the most part, the ideal that greater decentralisation will lead to improved accountability is accompanied by suspicion between management and council members over corruption and of people vying for the spoils of tenders.

Another way in which accountability and efficiency are built into governance functions is through constituency representation on the council. Council members are either elected by stakeholders or appointed by the minister, usually to bolster the skills needed to govern. The former are seemingly meant to represent the interests of specific groups. The incorporation of SRC representation in the college council, for example, was a key indication of inclusive governance practice in TVET colleges (Sithole, 2019). Although council members may be appointed to councils as representatives of a particular group, such as staff, students or

industry, there is no obligation for them to report back to their constituencies. The induction material given to councillors explains this.

> The individuals on the council are acknowledged as stakeholders, except for the external members, and the internal members are elected to represent the respective groups. However, they cannot report back to the group that elected them, since they are not answerable to them (DHET, 2019:49).

Council members therefore stand in as representatives of interest groups but are not expected to be accountable to them. Presumably, they are elected, or selected, on the basis that the stakeholders trust them to represent their interests. But as Mbatha (2023:189) notes, 'this viewpoint raises significant problems about stakeholder responsibility and representation within the governance framework'. The extent to which representatives are practically able to advocate on behalf of their interest groups depends on the individual's capacity and attentiveness to insert their cause on the council's agenda. For Mbatha (2023:189), 'actively including stakeholders strengthens the decision-making processes by incorporating their viewpoints and input'.

One constituency in which interviewees generally agreed that representation is ineffective is that of students. Although student representation on councils is viewed positively, particularly because the calibre of student leadership is established through setting benchmarks on academic performance, a very practical challenge for student representation is the annual turnover of SRCs (Mbatha, 2023). It was generally agreed that student representatives started contributing to council meetings only by the third or fourth meeting, which is shortly before their term of office ends. Moreover, the strategic issues dealt with at the council level were often not the priority issues on students' minds. As a principal explained:

> Students are interested in their issues and these are often dealt with outside council.

At the same time, the council would get directly involved in mediating and restoring relations between college management and students, as in the case of an urban college:

> Some of the issues which culminated [in] strikes and some unrest were as a result of poor relations with – management, especially … top management, and especially the principal and some staff, and other people will use students to react. But then we had to sit down and develop a plan to at least engage all the stakeholders.

Student representatives are often the least experienced members of council and the high-level strategic issues discussed in council meetings may be distant from the day-to-day issues that affect them. Nevertheless, their presence on the council is a reminder of the importance of students as key stakeholders in a college.

Another 'constituency' often absent from councils is industry. Provision is made for the appointment of a 'donor member' on the council. This person should be an industry

representative but it seems to be the most difficult appointment to make, and the position therefore continues to remain vacant on some college councils. It is also difficult to find one person who represents the breadth of the industry that surrounds colleges. Given that the policy intent is for colleges to become more relevant to the needs of the labour market, working relationships with industry are becoming increasingly important. Colleges need industry to secure placements for work experience for students, for their lecturers to gain exposure in order to understand what is happening in industry, and to understand the way in which they should adjust their programme qualification mix (PQM). However, there is little involvement from the councils to improve industry relationships and this is left to college management. One interviewee explained:

> It is the college that should invite industry. But we are not giving industry the opportunity to support us. They are willing. We are not giving them the opportunity.

Nevertheless, it appears that colleges are taking relations with industry more seriously. The chair of a rural college council pointed out the following:

> It is only recently that the council was given the rights to form a donor committee. The current terms of reference that [are] adopted now [give] a council almost a full right and full support of the integration between the industry and other donors with the college. But before that it was very difficult because it was more like the straightforward relationship where the council was not directly involved.

Another interviewee stated:

> Industry has always been included as part of our consultants in council. So, they form part of the invited members to sit in various committees. And that in itself is open to the industry to learn more about the college.

Councils appear to have been structured with both accountability and efficiency in mind. Members of councils include those representing stakeholders and those who are selected to be on the council because of the skills they bring to it. However, their roles on councils have been constrained by regulations and directives from DHET, and confusing lines of accountability mean that they have very little authority over college management.

Council operational procedures

The second way in which the form of councils might influence the way accountability and efficiency are interpreted lies in the mechanisms that councils use to carry out their functions. Council meetings are at the centre of governance activities; it is at these meetings that members interact, receive reports, discuss issues and make decisions. The general view expressed by interviewees was that governance meetings were conducted reasonably well and

were productive. More than half (53.47%) of the survey respondents indicated that the college council met four times a year, which aligns with legislated requirements. An analysis of the 2021/2022 annual reports revealed that some councils had 12 council meetings per year and one college council held 16 meetings, more than one per month.

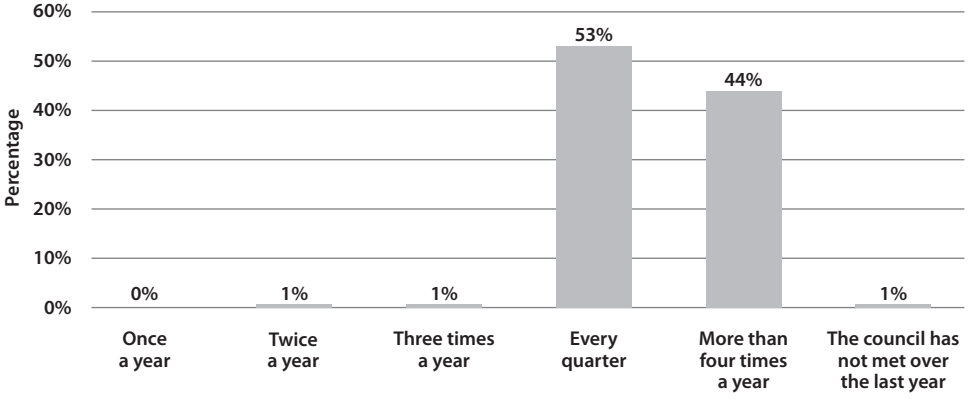

FIGURE 2: Frequency of TVET college council meetings per year

Source: Mzabalazo Advisory Services (MAS) Survey (N = 303)

With some exceptions, meetings are well attended but a few of the interviewees believe attendance is good simply because council members receive a fee for attending the meetings.

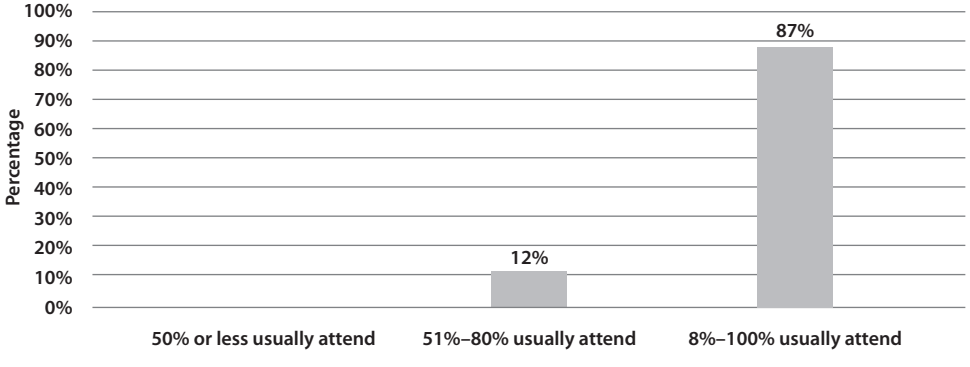

FIGURE 3: Attendance at council meetings

Source: MAS survey (N = 303)

Approximately 50% of the interview respondents indicated that meetings generally last between two and four hours, but in some instances they could go on for up to 14 hours, well into the night. Some chairpersons are of the view that the effectiveness of management's preparation has an impact on the duration of meetings:

> Their lack of preparedness makes it impossible to go through the material quickly, as the material is being explained during the meeting.

However, management countered that it is the council members who come unprepared. One principal complained of

> long meetings that mostly turn out to be fruitless.

Another principal remarked:

> Topics include delayed meeting payments and personal interests. Personal issues overshadow institution-related matters. Meetings become contentious and unpleasant. Meetings are often unproductive despite their length. Council members should assist and strengthen governance, not become problems for the institution.

Subcommittee reports are viewed as helping council meetings move with a certain level of productivity and direction. As one chairperson explained:

> Committees are doing the robust work, and by the time it gets to the council it is clear […] what […] management is seeking from the council through the committees.

However, some council members believe that these reports often take up significant time.

More than 80% of the council members who responded to the self-evaluations indicated that council meetings are conducted to ensure open and transparent communication, meaningful participation and timely resolution of issues. Although meetings generally followed an agenda, there were several examples where meetings were derailed, as the following three quotations from principals demonstrate:

> I will be brutally honest: you would feel that sometimes when you have a particular issue that you want approved, you wish that a particular member would not be present. Because you know, once they start talking, their discussion changes the entire meeting agenda to a different direction.

> They are aware that they are the highest decision-making body; without them, you can't approve your own budget as a principal. You can't approve the strategic plan.

> We often receive council members that do not have an interest in academic matters; they are here for their own interests. Although it is indirect, […] it is very easy to pick it up.

As Katsamunska (2016) points out, the composition of a council in which representatives do not necessarily have to account to their constituents results in more active members using their influence to sway decisions in favour of an interest group or in their own interests rather than in the interests of the college.

Meetings constitute the main activity of governance councils, but, to be productive, council members are required to have knowledge of the way in which the TVET system works and to be up to date with reports on the college and, more broadly, on policy and research. We now turn to the capacities of council members.

Capacities of TVET college council members

The third issue that affects the efficiency and accountability of TVET governance is the capacity of councils and the human resources available on councils. In order to achieve efficiency, council members require skills and knowledge about the way that college operations work and on ways of improving them. According to the CET Act (2006, Chapter 3, Section 10(4)), the 16-member council includes: the principal; lecturer, staff and student representatives; five ministerial appointees; one external member representing donors; and four additional external members with a broad spectrum of competencies in the fields of education, business, finance, law, marketing, information technology and human resource management (appointed by the council in consultation with the minister). The council should demonstrate a level of decision-making that, although not fully democratic, at the very least includes a wider range of participants – some of whom represent stakeholder groups – when making strategic decisions. While ministerial appointees have a slightly greater representation than other stakeholders, councils are structured so as to include a range of representatives. This also has instrumental value: it offers a wider range of ideas for consideration and improving the chances that there will be buy-in if decisions are made collectively.

At the time of this research in 2023, most college councils were established and constituted. However, only 16 (32%) had all their members appointed according to the requirements of the CET Act. King IV (IoDSA, 2002) requires the governing bodies to be adequately diverse. However, the data indicate otherwise: based on data provided by DHET in the Council profiles report of February 2023 (DHET, 2023), 36.9% of council members are female and 63.1% are male. Furthermore, of the total of 697 council members counted, 84.6% are African, 7.1% Coloured, 5.7% white and 2.6% Indian.

Moreover, the interviewees indicated that DHET's process for vetting and appointing ministerial council members is lengthy, with the result that positions remain vacant for long periods. However, the vetting process has not guaranteed that all ministerial appointees are suitable council members. At least three principals interviewed argued that they had had problems with ministerial appointees who came into councils with political agendas. One principal made a plea against 'cadre deployment'. Another explained:

> Even politicians will phone you and ask, 'Do you have a vacant position in council?'; 'Why?; 'We want someone to get in'; and I said, 'No, I don't appoint members. The minister does.'

The chairperson of a third institution noted:

> Sometimes the minister appoints people from communities who are educators or department officials. They come onto council and act like it is a glorified school and act like the principal's keeper. We have to look at the competencies when appointing people to council. People should have done King IV training.

The ethical conduct of council members was also raised in interviews with regard to individuals viewing their positions on council not as a voluntary service but rather a means of extracting money from the college. The interviewees indicated that some individuals treat council membership as a career or as a source of income and try to influence appointments and procurement accordingly. There is also a general view that many council members attend meetings primarily for the meeting fee they receive.

Most respondents indicated that both the representation and the size of college councils and committees are appropriate as there is a balance of skills. On the view that councils are too large, one interviewee commented:

> Effective boards are nothing more than eight people.

They also stated that there are too many subcommittees.

The interviewees noted that a lack of knowledge and experience among council members contributed to several governance problems, leading to their impeding the council's capacity to carry out its fiduciary duties and governance responsibilities. As one principal noted:

> To be honest, there are council members that I believe do not have any knowledge of the sector and feel that they don't add any value. You've got those who know more and a whole lot, and then you've got those who don't. And, I think, unfortunately, those who don't are appointed by the minister. You can't say anything as a principal – you get given these people.

Another interviewee noted that, while some professionals join a council possessing technical knowledge, they lack sensitivity to the way in which governance in the public service differs from that in the private sector. In this regard, one chairperson stated:

> The way councils are constituted, they are not getting 100% participation from the stakeholders. […] We must bring in more industry. We need to bring in more people who understand the college council or, rather, the TVET sector. Bring

> people who understand the impact of the TVET sector on our economy. Bring more current stakeholders from […] business, [the] community, education and training, in particular from a SETA, university and research perspective.

However, more than 80% of the council members who completed the self-evaluation agreed that councils comprise members with an appropriate mix of skills and experience.

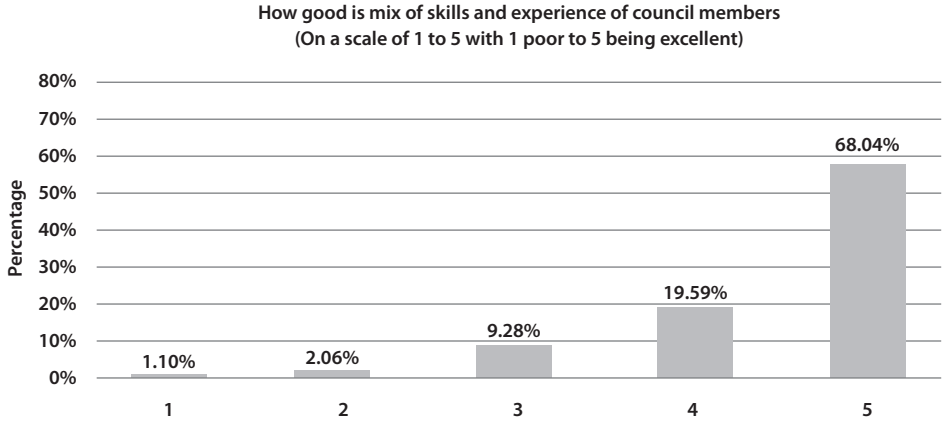

FIGURE 4: Responses regarding the competence of council members

Source: Consolidation of self-evaluations (N = 97)

Conclusion

The rationale for TVET college councils is not made explicitly clear in the relevant legislation. Instead, it can be inferred from the list of tasks given to councils to perform that they are meant to improve the accountability and efficiency of TVET colleges. But these terms are vaguely used. For example, the policy does not clarify the lines of authority and accountability. 'Efficiency' may refer to initiatives to cut costs and/or to improve procedures and/or respond to industry skills needs. While accountability and efficiency are not contradictory, they are ambiguous, and this can lead to a complex form of the way councils are structured and operate and of the capacities they require. It is the multiplicity of tasks and the criss-crossing lines of accountability that render the work of college councils complex in ways that may detract from both their efficiency and their accountability. The form councils take is not always appropriate given the fact that their functions are broadly defined and vague.

While, in principle, form should always follow function, in this article we have drawn on our research to show that, in the case of TVET college councils, function is often a response to the form that councils take. TVET councils are expected to be accountable for the efficient operation of colleges, but they have been hamstrung by the way that they are structured, by their operational procedures and by their human resource capacities. There are confusing lines of accountability, council meetings that do not drive strategy and a deficiency of

industry experts on councils. And although tasks are decentralised to councils, DHET still holds the reins on some of the most important levers that are necessary to improve the efficiency of colleges. These include the appointment of senior staff, the allocation of funding for DHET-approved programmes and centralised performance management. As a result, college councils add another layer of accountability to TVET colleges but they do so without necessarily contributing to their institutional development.

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EDITORIAL POLICY AND PROCEDURE

The *Journal of Vocational, Adult and Continuing Education and Training* (JOVACET) recognises the need for critical engagement through studies in TVET and Adult and Continuing Education and Training, and for encouraging critical scrutiny of this expansive knowledge area on the African continent.

The voices and experiences of practitioners, reflecting on all aspects of teaching and learning within vocational education and adult education settings, should be heard through publication of empirical and robust research. While the journal clearly wishes to take forward academic scholarship, it also seeks to strengthen opportunities for reflective practice that makes a scholarly contribution to the field. New knowledge emerging out of complex developmental contexts has significant value and needs to be showcased beyond existing geographical and political boundaries. The journal is therefore committed to also supporting the development of emerging researchers by providing them with a space to present and defend their research among a network of global scholars. Within the field of vocational and continuing education there is substantive 'grey literature' that remains in project report form. The journal is potentially a vehicle for the translation of this important work into an academic contribution to a wider community of practice and thereby enhancing its value.

The JOVACET will appear at least once a year. Unsolicited articles are welcome for consideration and should be uploaded onto the JOVACET's website online journal or else emailed to the journal's managing editor.

The editors are accountable for everything published in the journal and should therefore:

- work towards improving the contents of the journal;
- adopt peer-review methods best suited for the journal and the research community it serves;
- ensure that all manuscripts have been reviewed by appropriate reviewers;
- ensure quality assurance processes are in place for the material that is published; and
- uphold the highest standards of integrity, intellectual rigour and ethics.

The editors will not disclose any information about the submitted manuscripts or their authors to anyone other than the author(s) and reviewer(s), as appropriate.

Submitted articles will be reviewed by two anonymous external referees in a 'blind' peer-review process. Appropriate papers will be reviewed according to their significance and soundness. Articles that have been submitted must not have been published or accepted for publication elsewhere. The editors are responsible for deciding which of the manuscripts submitted to the journal will be published. The editors' decision to accept or reject a manuscript should be based on the importance of the manuscript, its originality and clarity, the validity of the study and its relevance to the journal's scope. Considerations will also include current legal requirements regarding libel, copyright infringement and plagiarism.

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The article should not contain any identification of the author and should be anonymised as far as possible. The name(s) and affiliations of the author(s), as well as their email address, should appear on a separate page.

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Journal of Vocational, Adult and Continuing Education and Training

VOLUME 9, ISSUE 1

You are invited to submit an article for the ninth volume of JOVACET to be published in October/November 2026. JOVACET is an accredited publication with the Department of Higher Education and Training.

Articles should be topical with regard to current debates/discourses and recent research in the TVET, adult, and continuing education and training domains. Submissions should be of high quality and follow academic research/writing conventions of journal articles in the social sciences. Specifications can be found on the JOVACET website (www.jovacet.ac.za) or obtained from Dr Catherine Robertson at cathy@tcrobertson.co.za.

Articles should be anonymised and comprise a maximum of 8000 words, which include the abstract of approximately 200 words and a list of references, and be submitted in MS Word format via the journal website at www.jovacet.ac.za or emailed to Dr Catherine Robertson at cathy@tcrobertson.co.za. In a separate document, include author details (designation, full names, email addresses and affiliation of each author). Kindly follow the style guide which is provided on the website. The length of the article and especially the length of the abstract must be strictly adhered to. Submissions not conforming will be automatically disqualified.

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