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Educator agency and collaborative learning for sustainability in southern African TVET: A communities of practice perspective

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ABSTRACT

Technical and vocational education and training (TVET) has become important in efforts to advance sustainable development, but little attention has been given to how educators translate education for sustainable development (ESD) into vocational pedagogy. This study examines how educator-led Change Projects enacted ESD in selected TVET settings in southern Africa. A qualitative secondary document analysis was undertaken of seven Change Projects from Botswana, Namibia and Zimbabwe documented in the Sustainability starts with teachers (SST) evaluation report. The projects addressed entrepreneurship, community-service learning, engineering redesign, repair cafés, information and communications technology-supported teaching, industrial attachment through beekeeping, and water management engineering. Cross-case analysis identified three pedagogical orientations: participatory and community-engaged learning, curriculum innovation for sustainability, and experiential and practice-based learning. Interpreted through Wenger's Communities of Practice (CoP) framework, these orientations demonstrate how collaborative participation, negotiated educational purpose and shared pedagogical resources shaped educators' responses to sustainability. The study argues that educator agency is an interpretive social practice through which sustainability acquires vocational meaning in particular institutional contexts.

Keywords: Change project, communities of practice (CoP), education for sustainable development (ESD), educator agency, southern Africa, technical and vocational education and training (TVET)

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Introduction

Historically, technical and vocational education and training (TVET) has been associated primarily with occupational preparation, employability and economic development (Allais, 2022; McGrath, 2012; McGrath et al., 2020). While these remain central purposes, contemporary ecological and social challenges have expanded expectations of TVET to include climate change, sustainable livelihoods, resource use and social justice (Marope et al., 2015). Reflecting this shift, Moso-Díez et al. (2025, p. 340) identify sustainability in TVET as a 'critical area of research'. In Africa, this expanding agenda has prompted renewed attention to the educational purposes of TVET. Majola (2026a; 2026b) challenges narrowly employment-centred conceptions of vocational education by emphasising agency, participation and socially responsive pedagogy. He argues for TVET that develops 'reflective, critically conscious citizens' (Majola, 2026b, p. 529). These developments highlight the need to understand how educators interpret sustainability in curriculum, pedagogy and assessment, since it is through their professional practice that sustainability aspirations acquire educational meaning.

The post-2015 sustainability agenda has bolstered this expectation. Sustainable Development Goal (SDG) 4.7 calls for students to develop the knowledge, skills, values and dispositions required to contribute to sustainable societies (UNESCO, 2017). In sub-Saharan Africa, Monk et al. (2023) similarly position TVET as an important praxis arena for environmental learning, sustainability innovation and livelihood development while cautioning against viewing vocational education as an autonomous solution to structural social and environmental challenges. Their analysis in the Ugandan context directs attention towards the situated processes through which educators translate sustainability into vocational learning.

This study examines those processes through the Sustainability Starts with Teachers (SST) programme, a partnership between UNESCO's Regional Office for Southern Africa and Rhodes University's Environmental Learning Research Centre implemented across 11 southern African countries (De Souza, 2024; Lotz-Sisitka et al., 2022). Using qualitative secondary document analysis, the study analyses seven educator-led TVET Change Projects from Botswana, Namibia and Zimbabwe involving entrepreneurship, community-service learning, engineering redesign, repair cafés, information and communications-supported learning, industrial attachment through beekeeping and water management engineering. The study examines how educators enacted education for sustainable development (ESD) through documented pedagogical, curricular and assessment practices.

The analysis is informed by Wenger's (1998) CoP framework, which provides a lens for understanding how collaborative professional learning shaped these initiatives. Cross-case analysis identified three pedagogical orientations: participatory and community-engaged learning, curriculum innovation for sustainability, and experiential and practice-based learning. These orientations are interpreted through the concepts of mutual engagement, joint enterprise and shared repertoire in order to explain how sustainability-oriented pedagogical knowledge was collaboratively developed. The study asks: How do educator-led

Change Projects enact ESD in southern African TVET and how does a CoP perspective explain the collaborative learning processes underpinning participatory and community-engaged learning, curriculum innovation for sustainability, and experiential and practice-based learning? The study argues that educator agency is expressed through the collaborative interpretation of sustainability in particular vocational contexts. Instead of implementing ESD as a predetermined agenda, educators negotiated locally meaningful pedagogical responses that connected sustainability with disciplinary knowledge, curriculum, assessment and workplace practice. The study contributes an educator-centred account of how collaborative professional learning shapes the situated enactment of sustainability.

Literature review

The relationship between TVET and sustainable development has attracted substantial scholarly and policy attention over the past two decades. Earlier conceptions of TVET were shaped strongly by employment, occupational competence, industrialisation and economic growth (Akoojee, 2016; Allais, 2022; McGrath, 2012). These purposes remain important in societies confronting unemployment and skills shortages, but climate change, ecological degradation, inequality and insecure livelihoods have enlarged the educational questions associated with work. Moso-Díez et al. (2025) reviewed research published between 2003 and 2024 and retained 82 publications after applying relevance and quality criteria. Their analysis characterises sustainability in vocational education and training (VET) as multidimensional and 'often approached in a fragmented way' (Moso-Díez et al., 2025, p. 340). Research on TVET is therefore substantial, although its conceptual emphases are dispersed across economic, social and ecological interpretations.

Economic perspectives often connect TVET with green jobs, labour market adaptation, new occupations and the capabilities required in changing production systems. Social perspectives emphasise inclusion, equity, citizenship and human development, while ecological perspectives give greater attention to environmental knowledge, sustainability competencies, curriculum, pedagogy and institutional practice (Moso-Díez et al., 2025). These distinctions intersect in vocational education. Occupational competence involves technical knowledge, material judgement, ecological consequences and social responsibility. Sustainability therefore concerns the substance and purposes of vocational knowledge. A strict opposition between employability and sustainability is conceptually inadequate because employment occurs within ecological, social and economic relations. McGrath and Powell (2016) locate TVET in a wider human-development perspective, while Ramsarup et al. (2024) connect vocational learning with sustainable futures. Moso-Díez et al. (2025, p. 342) similarly identify approaches in which sustainability enters 'the curriculum, pedagogy, and institution'.

The SDGs strengthen this wider educational orientation. SDG 4.7 identifies knowledge, skills, values and dispositions associated with sustainable development, human rights, gender equality, peace, global citizenship and cultural diversity (UNESCO, 2017). Green-skills research adds occupational concerns associated with climate mitigation, changing energy

systems and environmentally responsible enterprise (De Otero, 2019; International Labour Organization (ILO), 2019, 2022). TVET is consequently expected to connect occupational preparation with ecological and social responsibility. African research has contributed substantially to this reconceptualisation. Monk et al. (2023) present TVET as an important undertaking for environmental learning and sustainability innovation, especially where livelihoods are exposed to ecological disruption. Their analysis also cautions against assigning education an autonomous capacity to solve structural environmental and socio-economic problems. Educational initiatives operate in political–economic conditions and within institutional resource constraints, social inequalities and unequal access to productive opportunities.

This caution establishes an important principle for analysing educator-led change. Local pedagogical experimentation may reveal possibilities for sustainability-oriented TVET without demonstrating transformation of institutional systems, policies or professional identities. Evidence of situated practice must therefore be distinguished from claims of systemic change. The distinction is methodological, but it is also conceptual because educational change occurs across different levels and timescales.

Sustainability policy acquires educational substance through interpretation. Curricula may prescribe competencies, institutional policies may endorse ESD and international frameworks may define broad ambitions, but educators decide how these aspirations encounter particular subjects, students, workshops, assessment practices and local problems. Educator agency therefore occupies an intermediary position between policy language and educational experience. Moso-Díez et al. (2025) identify curriculum development, teacher training, professional development, pedagogical practice, institutional sustainability and student consciousness among established areas of research. Their review confirms that educators are present in the literature. The unattended issue concerns how their collaborative professional activity becomes a praxis where sustainability is interpreted, pedagogically reconstructed and translated into vocational practice.

Recent critical TVET research amplifies the importance of agency. Majola (2026a) argues that vocational education should engage critical consciousness, social responsibility and structural questions alongside occupational preparation. Majola (2026b) critiques policy narratives centred narrowly on economic growth, employability and labour market alignment and calls for greater attention to participation, human development and critical consciousness. These arguments raise a further question: what forms of educator learning make such pedagogies possible? ESD is not self-executing. Educators in engineering, entrepreneurship, information and communications technology (ICT) and other vocational fields must interpret sustainability through disciplinary knowledge and make decisions about learning activities, assessment, resources and relationships together with workplaces or communities. These decisions involve professional judgement and often require negotiation with colleagues because curriculum, assessment and institutional routines are socially organised.

Fullan (2016) places educator agency in broader accounts of educational change, while transformative learning discourse emphasises critical reflection, dialogue and the reconsideration of established assumptions (Cranton & Taylor, 2011; Mezirow & Taylor, 2009). These perspectives are relevant because sustainability may be encountered either as additional content or as a problem that calls existing practices into question. The second possibility makes educator learning central to curriculum change. Monk et al. (2023) add an epistemic dimension through their discussion of participation, knowledge and informal learning networks. Their work shows how vocational learning can become connected with community needs, livelihoods and environmental innovation. Expertise does not flow only from institution to student; communities, students and educators also contribute occupational, ecological and experiential knowledge.

Educator agency is therefore best understood as the situated capacity to interpret problems, exercise pedagogical judgement, work with others and construct educational responses in enabling and constraining institutional conditions. Collaboration becomes important because sustainability problems cross disciplinary and institutional boundaries. Professional dialogue, experimentation and exchange create spaces where new pedagogical meanings can be negotiated. The SST programme illustrates this through Change Projects that invited educators to develop responses involving curriculum, pedagogy, assessment and institutional practice (De Souza, 2024; Lotz-Sisitka et al., 2022; Van Staden & Lotz-Sisitka, 2023). Their conceptual significance concerns what they reveal about learning through collective educational practice. Collaborative experimentation should, however, be distinguished from institutionalisation. A new teaching activity, assessment routine or community partnership may constitute evidence of pedagogical innovation without proving durability, diffusion or incorporation into formal policy. An educator's report of changed thinking may likewise indicate professional learning without substantiating completed professional identity transformation. Educators work in curricula, qualification structures, institutional hierarchies, resource conditions and policy expectations. Collaboration may enlarge what they can imagine and attempt, but innovation remains shaped by these structures.

The literature also cautions against romanticising local agency. Sustainability initiatives encounter unequal institutional capacity, financial constraints, curricular rigidity, infrastructure shortages and uneven participation (Allais, 2022; Rosenberg et al., 2020; Tikly, 2019). Global sustainability concepts may provide common direction, but their educational meaning remains incomplete until interpreted through local ecological conditions, labour markets, communities and institutional histories. Tikly (2019) warns against reform models detached from African socio-economic realities, while Monk et al. (2023) connect environmental learning with livelihood formation and community futures. The just-transition literature adds that green economic change requires new occupational capabilities, while also raising questions of inclusion, distributive justice and social participation (ILO, 2019, 2022).

The literature therefore presents TVET as an expanding field with substantial work on sustainable development, green skills, social justice, curriculum reform, student agency, institutional constraints and the purposes of vocational education. Educator development and pedagogical practice are also recognised. One of the remaining knowledge gaps concerns how TVET educators collectively interpret ESD, construct pedagogical responses and generate situated professional knowledge through collaborative practice in southern African institutions. The present study addresses this gap through secondary qualitative analysis of seven educator-led SST Change Projects in Botswana, Namibia and Zimbabwe. Wenger's (1998) CoP framework provides the conceptual basis for interpreting collaborative educator learning and the pedagogical enactment of ESD.

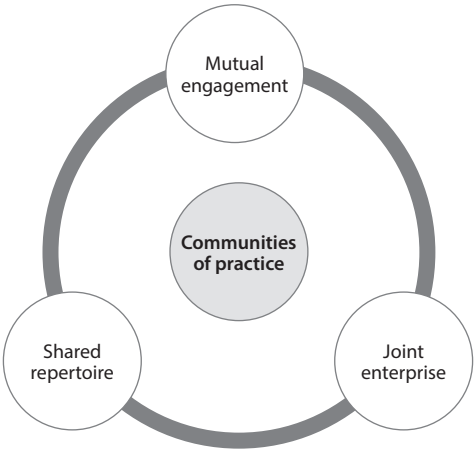
Theoretical framework

This study is informed by Wenger's (1998, 2000) CoP theory, which provides the conceptual basis for examining how TVET educators collectively interpreted ESD and translated it into pedagogical practice in the selected SST Change Projects. Wenger conceptualises learning as participation in social practice through which meaning, knowledge and practice are constructed collectively rather than acquired individually. This perspective is particularly appropriate because the study is concerned with educator collaboration around curriculum, pedagogy and sustainability, not with measuring programme outcomes or institutional performance. The interest therefore extends beyond identifying what educators did to understanding how collaborative professional activity contributed to the emergence of particular pedagogical responses to sustainability.

CoP theory offers an important departure from individualistic understandings of professional learning because it positions knowledge as something produced through participation in shared practice. Learning develops through interaction among people working around common concerns, where meanings are negotiated and practical responses evolve over time (Wenger, 1998). Such a perspective is especially relevant to sustainability education because ESD presents educators with complex educational questions that cannot be resolved through technical expertise alone. Sustainability introduces ecological, economic and social concerns that intersect with disciplinary knowledge, occupational practice and institutional priorities. Educators therefore engage in an interpretive process through which broad sustainability aspirations acquire pedagogical meaning in particular vocational contexts.

Wenger (1998) identifies mutual engagement, joint enterprise and shared repertoire as the defining dimensions through which CoP develop. These concepts provide a coherent explanation of collaborative professional learning and educator agency in the present study. Figure 1 shows the CoP framework.

Figure 1
Communities of practice theory



Mutual engagement directs attention to participation as the foundation of professional learning. Learning occurs through interaction among colleagues, students and other participants as educators exchange ideas, negotiate challenges and reflect on shared experiences. Sustainability learning is closely associated with interactions, particularly where educators collaborate around curriculum innovation, community engagement and practical sustainability problems. However, participation should not be interpreted as inherently harmonious. Contu and Willmott (2003) argue that CoP can obscure relations of power, exclusion and inequality, while Li et al. (2009) similarly caution against assuming that collaborative learning develops uniformly across organisational settings. These critiques are particularly relevant in southern African TVET, where institutional authority, resource constraints and unequal opportunities influence who participates and whose interpretations gain recognition. Mutual engagement therefore surfaces both the possibilities and limitations of collaborative professional learning.

Joint enterprise complements this perspective by explaining how educational purposes emerge through collective interpretation. Wenger (1998) argues that participants develop shared enterprises through negotiation rather than through simple acceptance of externally prescribed objectives. This insight is especially significant for ESD because sustainability does not enter vocational education as a fixed curriculum package. Although international frameworks such as SDG 4.7 articulate broad aspirations for sustainable development (UNESCO, 2017), educators remain responsible for interpreting what those aspirations mean in engineering, entrepreneurship, ICT, community-service learning or other vocational fields. Sustainability consequently acquires educational significance through disciplinary judgement and contextual interpretation. The CoP framework therefore explains how broad policy ambitions become meaningful through collective professional interpretation without assuming that identical understandings emerge across institutions.

The third dimension, shared repertoire, extends this argument by directing attention to the pedagogical resources that develop through collaborative practice. Wenger (1998) describes repertoire as the routines, concepts, tools, procedures and artefacts that communities create through participation. Sustainability-oriented professional learning becomes educationally significant when it produces practices that can organise teaching, curriculum or assessment. The Change Projects generated examples of such resources. These pedagogical products demonstrate how collaborative learning can acquire practical educational form. Their existence, however, should not be interpreted as evidence of institutionalisation or enduring organisational change. Contu and Willmott (2003) and Li et al. (2009) caution that communities may generate valuable practices without overcoming wider structural constraints. Questions of institutional authority, policy support, resource availability and organisational sustainability remain analytically distinct from the collaborative production of pedagogical knowledge.

The value of CoP in this study therefore extends beyond describing educator collaboration. It provides an explanation of how professional learning, negotiated educational purpose and pedagogical practice become interconnected. Mutual engagement explains participation as the social condition through which educators learn with colleagues and other participants. Joint enterprise explains how sustainability problems are interpreted and transformed into shared educational concerns. Shared repertoire explains how those negotiated understandings become embodied in curriculum, pedagogy, assessment and practical educational resources. Collectively, these concepts emphasise collaborative educator learning as a process through which sustainability is translated into vocational practice.

Meanwhile, Wenger's broader theory associates participation with identity formation. This insight remains theoretically important, but the present study adopts a deliberately bounded interpretation. The documentary evidence contains participant accounts of changed perspectives, greater awareness of sustainability and altered pedagogical thinking. These accounts provide evidence of reported professional learning and pedagogical reorientation. They do not establish enduring professional identity transformation because the available material does not document sustained changes in participation, professional recognition or self-understanding over time. This distinction preserves the explanatory value of Wenger's theory while aligning interpretation with the evidentiary limits of the study.

Within these boundaries, CoP theory offers a conceptual framework for understanding educator agency in sustainability-oriented TVET. It explains how collaborative participation, negotiated educational purpose and emerging pedagogical resources intersect in the social production of vocational knowledge. The framework therefore enables the study to explain how collaborative professional learning contributed to contextually meaningful enactments of ESD in the participating southern African TVET institutions.

Research design and methodology

This study employed a qualitative interpretive design based on secondary analysis of documentary evidence. The purpose was to examine how educator-led Change Projects represented and enacted ESD in TVET and to interpret the collaborative professional learning reflected in these documented practices. A qualitative approach was appropriate because the study sought to understand pedagogical meaning, educator learning and the interpretation of sustainability in particular institutional contexts instead of measuring programme outcomes or testing predetermined relationships (Creswell & Guetterman, 2025).

The study draws on documentary material contained in *Stories of leadership in education for sustainability: Communities of practice generating change for the common good in tertiary education institutions in eleven countries in southern Africa* (UNESCO & Rhodes University, 2023), an evaluative synthesis of the SST programme. Consequently, the research is best characterised as qualitative secondary document analysis. Document analysis views documents as socially produced sources that provide insight into practices, meanings and institutional processes while recognising that they are themselves products of particular purposes and contexts (Bowen, 2009; Morgan, 2022). The SST report combines project descriptions, participant reflections, interview extracts, institutional information and evaluative commentary. These materials constitute a single documentary corpus that had already been selected, edited and contextualised during programme evaluation. The study therefore analyses documentary representations of educator practice, not raw field data.

The SST programme was implemented through a partnership between UNESCO's Regional Office for Southern Africa and Rhodes University's Environmental Learning Research Centre across 11 Southern African countries. Change Projects formed the principal mechanism through which educators identified sustainability challenges in their own institutions and developed responses involving curriculum, pedagogy, assessment, institutional practice or engagement beyond the institution. For this reason, the Change Project, rather than the individual educator, constitutes the primary unit of analysis. Individual quotations are interpreted as educators' reported understandings in particular projects and are analysed alongside project descriptions. They are not used as independent participant cases from which broader claims about educator populations can be inferred.

The documentary corpus contains 138 initiated Change Projects, of which 134 recorded progress. This study examines seven purposively selected TVET cases from Botswana, Namibia and Zimbabwe. These cases were chosen because they met three criteria. First, each project had an explicit TVET or vocational orientation. Second, the documentary evidence provided sufficient detail to identify the sustainability problem being addressed together with the associated pedagogical, curricular or practice-based response. Third, the selected cases represented contrasting forms of ESD enactment, including entrepreneurship education, community-service learning, engineering redesign, repair-based circular economy practices, ICT-supported teaching, industrial attachment and water-management

engineering. Botswana, Namibia and Zimbabwe were selected because they belonged to earlier SST cohorts for which relatively mature documentary accounts were available, although they do not represent the only countries in the programme that undertook TVET-related work. The study therefore constitutes a purposively bounded comparative analysis designed to explore conceptual variation across cases rather than to provide a regional survey or representative sample.

The selected cases also provide sufficient diversity to examine how sustainability acquired different educational forms across vocational settings. The Botswana cases focused on entrepreneurship education, community-service learning and engineering responses to greenhouse gas emissions. Namibia contributed a repair-café initiative centred on circular-economy principles, waste streams and practical fabrication. Zimbabwe included ICT-supported formative assessment, industrial attachment linked to beekeeping, and engineering responses to water loss. These cases illustrate variation in vocational fields, sustainability concerns and pedagogical approaches while maintaining a coherent focus on educator-led ESD practice.

Ten educator quotations reproduced in the SST report were available across the seven Change Projects. These educators were not independently sampled for the present study. Their reflections were included because they formed part of the documentary source and were directly associated with the selected projects. Where the report provided detailed participant reflections, the analysis explored educator learning and pedagogical interpretation more fully. Where quotations were limited or absent, interpretation relied primarily on project descriptions. This distinction ensured that claims remained proportionate to the available evidence.

The documentary source also required careful consideration of evidentiary status. The report was compiled from multiple programme documents, including formative and final evaluation reports, annual reports, policy dialogue material, field visit documentation and Change Project records. It should therefore be understood as an authored synthesis. Project narratives provide evidence of reported activities, participant quotations provide insight into educators' interpretations and evaluative commentary supplies institutional context. Meanwhile, decisions regarding which projects, quotations and outcomes were included reflected the purposes of programme evaluation. The analysis therefore recognises that the available evidence is necessarily selective and cannot be assumed to represent every participant's experience or every dimension of each Change Project.

The analytical process combined thematic analysis with theoretically informed interpretation. Braun and Clarke's (2006) approach guided the identification and refinement of recurring patterns across the seven cases, while reflexive interpretation (Alvesson & Sköldberg, 2017) informed movement between documentary evidence, theoretical concepts and the wider TVET and sustainability literature. The first stage examined each Change Project individually to identify the sustainability problem addressed, the vocational context, the pedagogical response, educator and stakeholder participation, reported professional learning and

documented constraints. Cross-case comparison then identified three recurring pedagogical orientations: participatory and community-engaged learning, curriculum innovation for sustainability, and experiential and practice-based learning.

Wenger's (1998) CoP framework informed the second stage of interpretation. Instead of determining the empirical categories in advance, the framework was used to explain the collaborative learning processes associated with the three pedagogical orientations identified during thematic analysis. Mutual engagement provided a lens for understanding participation and collaborative learning, joint enterprise illuminated how sustainability problems acquired shared educational meaning and shared repertoire explained how collaborative activity generated pedagogical practices, curriculum adaptations and assessment resources. The framework therefore functioned as an interpretive rather than classificatory device, connecting observed pedagogical patterns with broader processes of social learning.

Throughout the analysis, participant quotations were interpreted together with the Change Projects to which they referred. Individual quotations were not used as independent proof of project outcomes or institutional change. Instead, they were considered alongside project descriptions, institutional context and patterns emerging across other cases. Greater analytical weight was assigned to cases supported by multiple participant reflections, while projects documented primarily through descriptive accounts were interpreted more cautiously. Table 1 shows the analytical scope of the study.

Table 1
Analytical scope of the study

Country	Institution code	Focus of Change Project	Quoted educator code(s) available in the source report
Botswana	A	Entrepreneurship/business education	A1, A2
	B	Community-service learning	B3, B4
	C	Engine redesign/reduction of greenhouse-gas emissions	C5
Namibia	D	Local green-skills repair cafés	D6, D7
Zimbabwe	E	ICT-supported teaching and formative assessment	E8
	F	ESD in industrial attachment, including beekeeping	F9
	G	Leak detection and water management/engineering	G10*

** Where a direct quotation relevant to the specific project activity is absent or limited in the source report, the analysis relies on the project description and does not attribute claims to participant testimony.*

The study also required explicit reflexivity because of my prior involvement in the SST programme. Participation in programme implementation provided contextual familiarity that informed interpretation but also created the possibility of reproducing programme assumptions or preferring favourable accounts. Reflexivity therefore became an ongoing analytical practice. Interpretations were checked against the documentary evidence, distinctions were maintained between participant testimony and evaluative description, and attention was given to reported constraints, uneven participation and institutional limitations alongside successful examples (Berger, 2015; Greene, 2014). Nevertheless, complete analytical distance cannot be claimed and this proximity remains part of the conditions under which the study was produced.

Ethically, the study relied exclusively on documentary material generated through the SST programme and did not involve new interviews or additional participant recruitment. Institution and participant codes were used to avoid unnecessary identification of individuals and quotations were reproduced only as they appeared in the source report. Individual reflections are interpreted as situated accounts of educator experience and are not presented as evidence of institution-wide attitudes, regional patterns or professional change (Locke et al., 2013).

Several limitations define the scope of interpretation. The study draws on a programme-generated documentary source in which project narratives and participant quotations had already been selected for evaluative purposes. The analysis therefore cannot recover omitted experiences or provide independent corroboration of reported activities. The documentary corpus offers uneven levels of evidence across cases, limiting equivalent comparison and preventing strong claims about long-term professional learning, institutional embedding or programme impact. As a purposively selected sample, the seven Change Projects are not representative of TVET institutions or SST initiatives across southern Africa. Their value lies in the conceptual insights they provide into educator learning, collaborative practice and the pedagogical enactment of ESD in particular institutional settings.

Research findings

The findings are drawn from secondary analysis of seven educator-led Change Projects undertaken in TVET institutions in Botswana, Namibia and Zimbabwe. Cross-case comparison identified three pedagogical orientations through which ESD was enacted: participatory and community-engaged learning, curriculum innovation for sustainability, and experiential and practice-based learning. These orientations emerged from the documentary evidence across the seven Change Projects. Participant quotations illustrate educators' reported experiences, while project descriptions provide documentary evidence of pedagogical, curricular and assessment practices. Because the documentary evidence varies across the cases, stronger claims are made only where the source report provides sufficient support.

Participatory and community-engaged learning

Participation formed a prominent feature of the documented Change Projects. Across the selected cases, educators organised learning through collaboration with students, colleagues and, in several instances, community partners. Participation therefore extended beyond classroom interaction to include shared planning, community engagement, professional learning and collaborative implementation of sustainability-related activities.

At Institution A in Botswana, the entrepreneurship Change Project initially concentrated on developing collaboration among members of the educator group before extending activities to students through entrepreneurship, office administration and accounting workshops. The project report indicates that the collaborative organisation of the educator group preceded wider student engagement. Reflecting on this experience, the project leader stated: 'It has made me know that[,] for the implementation of my change project, I need to engage students. Also[,] I should start with a group that I will be able to influence.' (A1) A second educator described the personal significance of participating in the project: 'It has changed my mindset, [that is,] the perspective [from] which I have been looking at things.' (A2) The documentary account also records that collaborative reflection generated what participants described as 'out-of-the-box' thinking and supported the development of new ideas during the project.

Participation extended beyond institutional boundaries in the community-service learning project at Institution B. The project integrated community engagement into a course module by organising students into four vocational groups representing accounting, hairdressing, tourism and agricultural economics. Each group undertook a needs analysis with community organisations relevant to its field. The accounting students worked with a primary school fundraising committee, the hairdressing students collaborated with salon entrepreneurs on health and safety, tourism students engaged a village development committee around a recreational park and agricultural economics students explored waste-related income opportunities with community stakeholders, including city council employees. An educator reflected that the initiative complemented curriculum developments already taking place in the institution: '[The institution] was in the process of infusing community-service learning as part of the teaching approaches; this [SST] training has come at the right time.' (B3). Another participant reported changes in classroom practice: 'I now teach with an open mind, including ecological aspects … to be included in my teaching.' (B4)

Institution D in Namibia also organised participation around collaborative activity through local repair cafés that involved trainers and students in repairing and repurposing discarded materials. The project documentation records activities involving wood, metal, rubber, batteries, oil and paper together with the fabrication of instructional aids from recycled materials. The initiative also established professional networks among TVET practitioners. The documentary evidence, however, indicates that participation was uneven. One participant observed: 'We are aware that a small change can have a large impact[;] however, there is a need to get buy-in from colleagues and students to make a lasting impact. Not everyone will

be on board and this is OK. The focus is on those who are willing to make a change and hope that others will follow.' (D7)

The Zimbabwean ICT project similarly organised participation across multiple groups, including lecturers, trainee teachers, mentors and school students. Staff-development workshops introduced participants to e-learning, mobile learning and electronic assessment, while one educator commented: 'The Programme equipped me to … effectively capacitate fellow workers on ESD practices; and (I) was equipped with the skills and knowledge to implement a change project.' (E8)

Participation also characterised the engineering project at Institution G, where educators and students worked together through lectures, experiments, fieldwork and research addressing water loss caused by damaged infrastructure.

Collectively, these cases demonstrate that participation was organised through collaboration among educators, students, colleagues and community stakeholders, although the nature and extent of participation differed across institutional settings.

Curriculum innovation for sustainability

The second pedagogical orientation concerned efforts to incorporate sustainability into curriculum, teaching and assessment. The documentary evidence records curriculum development at several institutions, although the extent of change differed across cases.

Institution A reported one example of curriculum-related uptake through the development of a minute-taking template produced during the entrepreneurship project. According to the documentary source, this template was subsequently adopted by the institution's Curriculum Committee for use across the college.

Curriculum innovation became more explicit at Institution B, where community-service learning was incorporated into a course module. The project also generated several curriculum resources, including a needs analysis instrument, a student self-evaluation tool and an assessment instrument linked to students' portfolios of evidence. The report records that the assessment tool was later adapted and standardised for departmental use.

Engineering education formed the focus of curriculum development at Institution C. The Change Project addressed greenhouse-gas emissions associated with older vehicles while encouraging students to investigate alternative engineering responses. The documentary evidence records attempts to revise engineering curriculum and assessment criteria to include ESD principles. Participant C5 described this experience as follows:

> The process of developing a Change Project has helped me to develop an in-depth understanding of the significance of sustainability. I have gained insights

> into how to develop an inclusive[,] working Change Project ideal for transforming community activities that contribute to greenhouse gas emissions. I can look within the current curriculum for workable ESD opportunities and further improve or influence policy and decision-making towards ESD. (C5)

The ICT project at Institution E also focused on curriculum development through the use of electronic learning and assessment technologies. The documentary source records staff-development workshops that introduced educators to e-learning, mobile learning and electronic assessment, while programme reports refer to renewed departmental collaboration around curriculum transformation and increased capacity to use ICT in teaching and assessment.

Institution F incorporated ESD into the Industrial Attachment Programme through curriculum revision linked to beekeeping and honey production. The report records that a departmental community worked on curriculum innovation, developed a new Industrial Attachment assessment tool and submitted the revised curriculum for institutional approval. Participant F9 reflected on the learning experience: 'All the presentations and excursions were new and a rare lifetime experience[;] therefore I will cherish the workshop very much.' (F9)

Institution G similarly incorporated ESD into engineering course outlines, coursework and examination assessment. The project documentation reports staff-development workshops involving colleagues from other departments and sister organisations, together with revisions to engineering teaching and assessment that addressed sustainability knowledge within the departmental curriculum.

Across these cases, sustainability entered existing vocational curricula through revised course modules, assessment instruments, curriculum resources, course outlines and teaching practices. The documentary evidence also records instances of departmental adoption and curriculum approval processes in several institutions.

Experiential and practice-based learning

The third pedagogical orientation centred on practical engagement with sustainability through vocational activities. Instead of introducing sustainability as abstract content, the projects connected it with authentic occupational practices.

Engineering projects provided several examples. Institution C involved students in designing a model vehicle emission device while shifting attention from repairing older engines towards engineering approaches that addressed greenhouse-gas emissions. Institution G addressed water loss through leak-detection activities involving lectures, experiments, fieldwork and engineering research. Students investigated damaged pipe systems and participated in practical activities linked to engineering solutions for water management.

Institution D approached sustainability through repair cafés that focused on repairing, repurposing and reusing discarded materials. Trainers and students worked with waste streams including wood, metal, rubber, batteries, oil and paper while fabricating instructional aids from recycled materials. The documentary source also records candidate assessment, monitoring and evaluation activities associated with the project.

Practical learning also characterised Institution F, where industrial attachment incorporated beekeeping and honey production as examples of sustainable livelihoods. The project connected workplace learning with sustainable production and generated an assessment tool to support the revised Industrial Attachment Programme.

Community-service learning at Institution B also involved practical investigation of local issues. Students undertook needs analyses in their respective vocational fields before developing responses linked to fundraising, health and safety, tourism development and waste-related income generation. Practical engagement therefore formed part of the learning process rather than serving as an additional activity outside the curriculum.

The ICT project at Institution E likewise emphasised practical application. Staff-development workshops demonstrated e-learning, mobile learning and electronic assessment, enabling educators to experiment with digital approaches intended to reduce paper-based assessment and improve access to teaching resources under conditions of limited infrastructure. This shows that 'TVET is key in implementing ESD' (D6).

Across the seven Change Projects, experiential learning was expressed through engineering design, community investigation, repair work, ICT application, industrial attachment, entrepreneurship and environmental problem-solving. The documentary evidence also records the production of practical educational resources, including assessment instruments, needs-analysis tools, curriculum adaptations, instructional aids, engineering models and ICT-supported teaching practices. These resources formed part of the reported project outputs across the selected institutions.

Discussion

This study examined how educator-led Change Projects enacted ESD in selected TVET institutions in Botswana, Namibia and Zimbabwe. Across the seven cases, three pedagogical orientations emerged: participatory and community-engaged learning, curriculum innovation for sustainability, and experiential and practice-based learning. These findings suggest that sustainability did not enter vocational education as a predefined body of knowledge to be implemented uniformly. Instead, educators interpreted broad sustainability aspirations in relation to the occupational, institutional and community contexts in which they worked. The findings therefore position educator agency as an interpretive and collaborative process through which ESD acquires pedagogical meaning. Wenger's (1998) CoP framework provides a useful explanation of how this process unfolds through participation, negotiated educational purpose and the development of shared pedagogical practices.

The first pedagogical orientation demonstrates that participation was central to the enactment of ESD. Across the cases, educators worked with colleagues, students and community partners to identify sustainability challenges, design learning activities and implement pedagogical responses. These collaborative relationships extended learning beyond conventional classroom boundaries and situated vocational education in wider social and environmental contexts. Wenger's (1998) concept of mutual engagement explains this finding by locating professional learning within participation in shared practice rather than individual acquisition of knowledge. From this perspective, educators developed new pedagogical understandings because they engaged collectively with practical educational problems. This interpretation is consistent with Fullan's (2016) view that educational change depends on the professional capacity to exercise judgement in institutional contexts rather than simply implementing externally prescribed reforms. Similarly, Priestley et al. (2015) conceptualise teacher agency as emerging through interactions between professional capabilities and the ecological conditions within which educators work. The Change Projects illustrate this relational understanding of agency. Educators did not act independently of curriculum structures, institutional expectations or resource constraints. Instead, they exercised professional judgement by determining how sustainability could be addressed in their vocational disciplines and institutional settings.

The findings also demonstrate that collaborative participation should not be understood as uniformly inclusive or harmonious. The Namibian repair-café project, where educators acknowledged the difficulty of securing commitment from colleagues and students, indicates that participation remained uneven and negotiated. This finding strengthens, rather than weakens, the explanatory value of Wenger's framework because it resonates with critiques that CoP can understate issues of power, exclusion and differential participation. Contu and Willmott (2003) argue that participation is shaped by organisational relationships and competing interests, while Li et al. (2009) similarly caution against assuming that collaboration develops naturally in organisational settings. The present findings support these critiques by showing that collaborative learning depended upon institutional support, professional commitment and opportunities for participation. They also support Monk et al.'s (2023) argument that sustainability-oriented vocational learning develops through relationships connecting educational institutions, communities and local livelihoods.

The second pedagogical orientation demonstrates that sustainability became meaningful through curriculum interpretation rather than curriculum addition. Instead of introducing ESD as a separate topic, educators re-examined existing vocational curricula in the light of locally significant sustainability challenges. Engineering educators addressed vehicle emissions and water management, entrepreneurship educators connected business education with sustainability, community-service learning linked vocational programmes to local development priorities, while ICT projects reconsidered assessment practices under conditions of resource scarcity. These findings indicate that educators interpreted sustainability through the knowledge structures and occupational concerns of their respective disciplines. Wenger's (1998) concept of joint enterprise provides a useful explanation because it

emphasises that shared educational purposes are negotiated through collective activity rather than prescribed in advance. The Change Projects reveal that sustainability acquired educational meaning through collaborative interpretation of vocational problems instead of direct implementation of policy aspirations.

This finding contributes to debates concerning sustainability in TVET. Moso-Díez et al. (2025) argue that sustainability in vocational education encompasses interconnected environmental, social and economic dimensions but is fragmented across educational practice. The present findings suggest that these dimensions become integrated when educators reinterpret vocational knowledge through authentic occupational problems. Vehicle emissions connected engineering competence with environmental responsibility; community-service learning linked vocational education with community development; repair cafés combined circular-economy principles with practical skills; and industrial attachment connected sustainable livelihoods with workplace learning. Sustainability therefore became embedded in vocational knowledge itself rather than being positioned alongside it. This interpretation aligns with Tikly's (2019) argument that educational reform in African contexts must be understood in relation to local institutional and socio-economic conditions. Likewise, Lotz-Sisitka (2016) argues that transformative sustainability learning emerges through engagement with situated socio-ecological issues rather than through abstract policy commitments. The findings therefore indicate that global sustainability agendas acquire educational substance only when educators negotiate what they mean in particular vocational fields.

These curriculum developments also broaden prevailing understandings of vocational competence. Traditional conceptions of TVET have prioritised employability, productivity and economic development (Allais, 2022; McGrath, 2012). More recent discourse argues for broader educational purposes that incorporate sustainability, human development and social responsibility (McGrath & Powell, 2016; Ramsarup et al., 2024). Majola (2026a, 2026b) similarly advocates TVET pedagogies that emphasise participation, agency and critical engagement with social and environmental issues. The present findings demonstrate how educators translated these broader educational purposes into curriculum and assessment practices. Sustainability did not replace occupational competence. Instead, it expanded the criteria through which competent vocational practice was understood.

The third pedagogical orientation demonstrates that sustainability became pedagogically meaningful through practical engagement with vocational work. Engineering redesign, repair cafés, industrial attachment, community-service learning, entrepreneurship and ICT-supported assessment all connected sustainability with authentic occupational activities. These practical interventions generated assessment instruments, curriculum resources, instructional materials, engineering tasks, needs-analysis tools and revised teaching practices that supported sustainability-oriented learning. Wenger's (1998) concept of shared repertoire explains this pattern by highlighting how collaborative learning produces tangible resources that shape subsequent professional practice. The significance of these resources lies not

simply in their existence but in their capacity to make sustainability teachable through concrete pedagogical practices.

Meanwhile, the findings distinguish between pedagogical production and institutionalisation. Several projects generated assessment tools, curriculum revisions and teaching resources, while some documented departmental adoption or curriculum approval processes. However, the evidence does not establish that these practices became permanently embedded across institutions or diffused throughout the wider TVET system. Li et al. (2009) caution against assuming that practices emerging in CoP automatically become enduring organisational routines and the present findings support this caution. The documentary evidence demonstrates local pedagogical enactment and, in several cases, documented institutional uptake. It does not support broader claims concerning sustained institutional transformation or system-wide change. This distinction recognises that pedagogical innovation and institutional embedding represent different stages of educational change.

The participant reflections further validate this interpretation. Educators described changed perspectives, greater attention to ecological dimensions of teaching and deeper understanding of sustainability. These accounts indicate professional learning associated with participation in the Change Projects. Wenger (1998) conceptualises learning as changing participation in shared practice, while Mezirow and Taylor (2009) and Cranton and Taylor (2011) emphasise the role of critical reflection in reshaping professional perspectives. The findings are consistent with these theoretical positions but do not justify claims of enduring professional-identity transformation. The documentary evidence captures educators' reported reflections at particular moments and documents associated pedagogical developments, but it does not trace long-term changes in professional identity or practice. The stronger conclusion is therefore that collaborative professional learning informed pedagogical judgement and supported local curriculum and assessment innovation.

The study addresses a conceptual gap concerning how educators participate in making sustainability teachable in TVET. Studies have substantially advanced understanding of sustainability in TVET through research on green skills, curriculum reform, institutional sustainability and transformative pedagogies (Majola, 2026a, 2026b; McGrath & Powell, 2016; Monk et al., 2023; Moso-Díez et al., 2025; Ramsarup et al., 2024). Less attention has been given to the collaborative processes through which educators interpret sustainability and translate broad policy aspirations into pedagogical practice. The present study positions educators as active interpreters of sustainability whose professional judgement shapes curriculum, assessment and vocational learning in specific institutional contexts. Wenger's (1998) CoP framework provides a coherent explanation of this process by showing how mutual engagement supports collaborative learning, joint enterprise enables educators to negotiate educational purpose and shared repertoire gives those interpretations practical pedagogical form. These findings suggest that educator agency in sustainability-oriented TVET is best understood as a collaborative and interpretive process through which sustainability becomes meaningful in vocational education.

Limitations of the study

The findings should be read within the boundaries of the documentary evidence and the purposively selected seven Change Projects. The SST report provides uneven levels of detail across cases and represents participants' experiences through an already curated evaluative account. Consequently, the study cannot establish the durability of reported pedagogical changes, completed professional-identity formation or the extent to which local curricular innovations became embedded beyond the settings documented. The analysis therefore offers theoretically informed insight into situated educator learning and ESD enactment, with transferability dependent on the contextual comparability of other TVET settings. Evidence of institutional or system-level change would require further research drawing on independent evidence from educators, students, institutional leaders and curriculum or policy processes.

Conclusion

This study responds to a specific gap in an expanding body of TVET and sustainability research: insufficient understanding of how TVET educators collectively interpret ESD and translate it into contextually meaningful pedagogical practice. Analysis of seven Change Projects from Botswana, Namibia and Zimbabwe shows that sustainability acquired vocational meaning through educators' engagement with concrete curricular, occupational and community problems. The evidence identifies three interconnected pedagogical orientations: participatory and community-engaged learning, curriculum innovation for sustainability, and experiential and practice-based learning. Wenger's CoP framework theorises these orientations by showing how mutual engagement, joint enterprise and shared repertoire demonstrate the collaborative processes through which these pedagogical responses developed. The study therefore positions TVET educators as interpreters and producers of situated pedagogical knowledge, while understanding reported changes in perspective as professional learning and pedagogical reorientation, not evidence of completed professional-identity transformation. The study has therefore theorised sustainability-oriented TVET as a socially situated process in which collaborative educator learning connects policy aspirations with vocational knowledge and practice.

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