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Rethinking ecological crisis and sustainability in the TVET colleges: a global citizenship education approach

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Abstract

In an era marked by unprecedented environmental challenges, the ecological crisis has emerged as a fundamental concern that transcends national boundaries. Climate change, environmental degradation, biodiversity loss, war and conflict, unsustainable resource use and management, are not spatially confined, but rather a global challenge. As global citizen, we are confronted with the urgent task of rethinking our approaches to sustainability, aiming to cultivate an inclusive and broadminded perspectives that embraces collective responsibility. Through Global Citizenship Education (GCE), higher education institutions including TVET colleges, are best to challenge the global ecological crisis, given their engagements with the local and international communities. Some of the findings include, but are not limited to, stakeholders' limited knowledge and understanding of the importance of greening the curriculum, skills mismatch and the absence of a policy framework on greening approaches. This study explores GCE as an effective approach in greening the curriculum, focusing on sustainability and a practical, transformative approach. A qualitative Participatory Action Research (PAR) methodology is adopted, framed by post-humanism theory. The three dimensions of Critical Discourse Analysis (CDA) uncover a deeper meaning embedded in text and conversations.

Keywords: Ecological and sustainability crises, global citizenship education, TVET college education, green curriculum

Introduction

This paper responds to a special call on curriculum studies scholarship in the context of the contemporary world crisis, focusing on ecological crises and the sustainability theme. Moore (2017) situates the ecological crisis in the unsustainable Anthropocene Era of the Industrial Revolution, the birth of exploitative capitalism (Mendoza-Vasconez et al., 2022; Soriano, 2018). In addition, Foster (2022) postulates ecological crisis as the planet's vulnerability from human actions that negatively impact the natural, social, economic and political spheres. Ecological crisis, including climate change, land degradation, loss of biodiversity, forced migration, war and conflicts over natural resources, pandemic diseases, to mention a few, are defining problems in the 21st century (Hufnagel, 2024; Makhmudova, 2024). They therefore underscore immediate global interactions and collectivised efforts (Hufnagel, 2024). The United Nations (UN) introduced sustainability as the global effort to build resilience and mitigate the impact of ecological crisis, by creating a balance in meeting the needs of the current generations without compromising the future generation's needs (Visser, 2017).

The United Nations Educational, Scientific and Cultural Organisation (UNESCO) identified education institutions, including TVET colleges, as central in achieving sustainability (UNESCO, 2015, 2020). UNESCO adopted the strategy for TVET colleges as a system to equip all young people and adults with the necessary skills for employment, decent work, entrepreneurship, and lifelong learning, while supporting the broader

goals of the 2030 Sustainable Development Goals (SDG) agenda (UNESCO, 2021). The 2030 SDG 4.7. guide for promoting sustainable development through various approaches, including Global Citizenship Education (GCE) (UNESCO, 2019). GCE is an educational approach to develop students' knowledge, skills, values and attitudes required for a more just, peaceful, tolerant, inclusive and sustainable world (UNESCO, 2014, 2024). The GCE expertise is required in the TVET colleges to re-imagine education and training that responds to the SDG local and global needs (UNESCO, 2021).

Background

The UNESCO International Centre for Technical and Vocational Education position the role of TVET colleges as the centre to connect education with the world of work, empowering youth and adults with skills needed for employment, decent work, lifelong learning and responsible citizenship (UNESCO, 2021). TVET colleges are critical in addressing global challenges such as youth unemployment, skills mismatches, and transitioning to a green paradigm (McCoshan, 2022). They are instrumental in providing expertise and resources needed for adaptation to the evolving social, economic, political, environmental, and technological sustainability challenges of the globalised world (Nielsen et al., 2023).

TVET colleges, initially referred to as technical colleges, have a historical human-centred origin, developing skills restricted to promote human capital and economic growth without integrating environmental and social responsibilities (UNESCO, 2014). The institution's activities were underpinned initially by unsustainable, intensified high resource production, extraction and consumption (McGrath & Russon, 2023). The market-focused curriculum was designed to develop mechanics, chemistry, agriculture, civil engineering, carpentry, mental work, and textile production skills to support the growing industrial sectors (Stützner & Szöllösi, 1985). Such skills development hugely relies on high energy consumption, high waste generation, burning of fossil fuels, different forms of pollution and health risks, to name a few, posing ecological challenges and environmental sustainability (McLamb, 2011; Wang & Azam, 2024).

Similarly, in South Africa, the need for technical colleges was driven by mining and industrial development in the 1800s, which was driven by apartheid policies (Daniels, 2018). The purpose was to develop skills that meet the manufacturing and industrial demands, including developing railways, engineering workshops and harbours (Ngcwangu, 2015; Thabede, 1996). As such, TVET colleges face increasing pressure to transition from unsustainable education and training towards green education approaches (McCoshan, 2022). In responding to the above global ecological challenges, UNESCO, among others, recommend the transformation of TVET college curriculum by incorporating the skills for green transition as a measure to respond to changing skill demands, and to mitigate the global ecological crisis (McCoshan, 2022; UNESCO, 2021). SDG 4:7 guides the acquisition of such skills through different approaches, including the GCE (UNESCO-APCEIU, 2017).

The green transition is recognised as a global phenomenon, and its effective implementation requires approaches that foster global awareness and responsibility (McCoshan, 2022; Nielsen et al., 2023). This perspective makes GCE a relevant approach in the greening of TVET curriculum in changing the TVET colleges' programs, services, and procedures to be attuned with the global needs for green transition (Ghorbani et al., 2024; McCoshan, 2022). The relevance stems from GCE's definition of an educational approach that aims to equip students with knowledge, skills, values, and attitudes to engage in global ecological crisis issues and contribute to a sustainable world (UNESCO, 2024). Hence, this paper explores GCE as an effective approach to green the TVET curriculum.

Problem statement

Although GCE is identified as a relevant approach to integrate green content and programs in the TVET curriculum, its effective implementation is still a global challenge (Chinengundu & Hondonga, 2022; Monzó-Martínez et al., 2024). The greening of the TVET curricula is crucial in providing a detailed

description of green content and program objectives, defining the expected learning outcomes, and guiding learning and training methods as outlined and expressed in the green competency standard (McCoshan, 2022). Therefore, the Green curriculum specifies all the elements of TVET programs and qualifications compatible with green jobs and entrepreneur markets (McCoshan, 2022; UNESCO, 2023). It further addresses the skill mismatches as industries transition to the green paradigm, creating the growing needs for a workforce with green expertise (Fongwa & Mncwango, 2020; Zaime et al., 2023).

Globally, literature reports the lack and absence of the integration of green skills content and programs in the TVET curriculum. Amongst others, Li et al. (2023) and CEDEFOP (2020) report the absence of national initiatives and explicit strategies for education and training in green initiatives, the lack of knowledge and understanding of green skills (Ibrahim et al., 2024). The prioritisation of technical skills and knowledge-based competencies with limited focus on environmental sustainability also poses a threat to participatory approach competencies required for a green curriculum (Rosenberg et al., 2016). Literature further reports the absence of a policy framework guiding the greening of the TVET curriculum, resulting in institutions designing strategies to suit their individual needs (McCoshan, 2022). This led to green skills content and programs offered on an ad hoc basis (Murris, 2019), driven by individual market demands and economic crisis (Freimann & Magnus, 2023). The challenges, therefore, fail to address the interconnected nature of green skills, to incorporate and enhance GCE approaches required to equip students with expertise to be compatible in the global green markets (UNESCO, 2024).

Several approaches in integrating green skills in the TVET curriculum have been reported, including considering stakeholder involvement in advancing the greening processes and achieving sustainability goals (Owusu-Agyeman & Aryeh-Adjei, 2024). Jayaprakash (2024) adopted Education for Sustainable Development (ESD) as a comprehensive strategy to integrate ecological awareness into the fundamental aspects of vocational training. The green technology approach improves TVET students' employability in China (Li et al., 2023). While the studies are essential in contributing to the discourse of greening the TVET curriculum, the above literature reveals a gap in adopting GCE as an approach. Therefore, this study aims to explore the effectiveness of GCE in improving the greening of the TVET college curriculum.

Research Objectives

The following research objectives guide this paper:

- To explore the TVET college's understanding of the need to green the curriculum.
- To explore the challenges of greening the TVET college curriculum.
- To examine the relevance of GCE as an appropriate approach to greening the TVET college curriculum.
- To demonstrate the evidence of the success of GCE as a relevant approach to greening the TVET college curriculum.

Literature review

The ecological crisis presents an array of global unsustainability challenges in the social, economic, political, environmental and technological spheres, requiring education and training to transition to sustainability (Abo-Khalil, 2024). TVET colleges are key players in enhancing the transition to sustainable development (McCoshan, 2022; UNESCO, 2021). TVET institutions globally are guided by UNESCO UNEVOC, the International Centre for Technical and Vocational Education and Training (UNESCO, 2021). UNESCO UNEVOC responded to the ecological crisis by introducing the 'Greening the TVET College' framework. The framework adopts a holistic and systematic approach of five pillars of the greening process, including greening the campus, the curriculum, the methodology, the community, and the institutional culture (McCoshan, 2022; UNESCO, 2017). The purpose is to align the TVET training programs and practices with sustainability and ensure that

TVET college students are equipped with skills required in the green labour market (McCoshan, 2022; UNESCO, 2021).

The conceptual underpinning of greening was developed as a transformational movement out of the need to address the global ecological crisis from climate change and its related impacts (Sajeewanie et al., 2019). The concept was coined as a symbol of ecology, and a defining ideology of reducing carbon footprint and greenhouse anthropogenic emissions and related activities (Thrall, 2019). The concept then became the brand for the 'just transition' wide range of 21st-century processes, products and services, including green skills, jobs, economy, technology, logistics, growth, and more (Fund, 2022; Hussain et al., 2021). Therefore, the greening of the TVET colleges program is coined from the ecological sustainability ideology to guide the transformation of systems and services. Although the greening framework is holistic and integrated, amongst the five pillars, this paper focuses on the greening of the curriculum as a transitional measure to sustainability.

The need for greening the curriculum.

Literature reports the lack and absence of integration of green skills content and programs in the TVET curriculum, resulting in no explicit strategies for green skills development being put in place (Mukundi & Njuki, 2019; Mulenga & Kabombwe, 2019; Ngaruiya, 2023; Zaime et al., 2023). The greening of the curriculum is crucial as it forms a link with the green competency standard and translates the expressed needs into green programs. It is a detailed description of green content, objectives, learning and expected outcomes, training methods and materials of a given educational program or qualification (CEDEFOP, 2020; McCoshan, 2022). UNESCO UNEVOC provides approaches to greening the TVET college curriculum, including integrating green content and programs in the existing courses or as a standalone module (UNESCO, 2021). Providing multiple approaches illuminates the critical need to green the curriculum. Therefore, the absence of green curriculum in the TVET college poses a considerable challenge of misalignment of programs with the green labour market needs (CEDEFOP, 2020; UNESCO, 2019).

Several studies support the above statement on the impacts of the lack or absence of a green curriculum. Jayaprakash (2024) reports the absence of green technology in the TVET college in Malaysia, which hindered the students' capacity development in green technology, leaving the institution without green technology personnel. Literature also reports the mismatch between programs and services offered in the TVET colleges, and the high global green skills demand required for green occupation and markets (Isa et al., 2019; Jerald et al., 2024; Zaime et al., 2023). This is said to be because of the absence of a green competency standard to translate the needs into green skills competencies and programs (McCoshan, 2022; UNESCO, 2017).

The lack of green skills and expertise in the TVET colleges has been further found to be the main contributor to global youth unemployment (Strietska–Ilina & Mahmud, 2019). Moreover, green skills content and programs are defined by the curricula of other courses and job profiles according to market demands and economic crisis of a given country (Freimann & Magnus, 2023; Persson Thunqvist et al., 2023), focusing on knowledge acquisition rather than on practical skills (Zaime et al., 2023), and offered on an ad hoc basis (Freimann & Magnus, 2023; OneWorld, 2018). Therefore, the literature report calls for different approaches in greening the TVET college curriculum.

The relevance of GCE as an approach to greening the TVET college curriculum

It is evident from the above discussion that the TVET colleges' traditional approaches to the greening program fail to address the holistic, interconnected nature of green skills. Green skills development is a global phenomenon and requires inclusive, collectivised and collaborative approaches that develop expertise to resolve the existing and emerging global 21st-century challenges caused by globalisation (UNESCO, 2015, 2023, 2024). The 2030 SDG guides 4:7 provides for acquiring knowledge and skills required for sustainable development through different approaches, including GCE (UNESCO,

2015). GCED is defined as a multifaceted guiding framework, highlighting the importance of education in cultivating learners' knowledge, skills, values and attitudes, equipping them with expertise to contribute to a more equitable, peaceful, tolerant, inclusive, secure and sustainable world (UNESCO, 2023, 2024).

GCE guides civic learning where students engage in practical projects dealing with social, political, economic, technological and environmental problems affecting the world (Saleem et al., 2022). The multifaceted approach makes GCE a comprehensive and diversified framework relevant to adopting and integrating green concepts, programs, methodologies, and theories in the TVET curriculum (Akkari & Maleq, 2020). Furthermore, it is a relevant approach in raising awareness on sustainable development and addressing both theoretical and practical green skills competencies required for a sustainable lifestyle and practices (McCoshan, 2022).

Several studies support the need for GCE in education and training, including the TVET colleges. Chinengundu and Hondonga (2022) argue that TVET colleges in Zimbabwe must enhance GCE to address the students' skill job mismatches. The need to understand how teachers are theorising and researching the presence of GCE in education programs is also argued as crucial in the dissemination and execution of education-related themes (Yemini et al., 2019). The successful implementation of GCE further enriches the educational experiences and contributes to the development of future leaders capable of solving the world's pressing issues (Ruiz-Mallén & Heras, 2020).

Research on GCE as an approach to greening the TVET college curriculum is relatively scarce, despite the growing recognition of its importance in developing the students' diversified expertise to solve global sustainability problems. We draw this argument from Langthaler et al. (2021), who report the need for inclusive and transformative teaching and learning approaches reoriented for green skills development. We further agree with Pacho (2020), emphasising the need for global competencies to engage in effective interactions and act for collective wellbeing and sustainable development. This study, therefore, intends to contribute to the literature gap by illuminating the relevance of GCE with the focus on sustainability and a practical, transformative approach in greening the TVET college curriculum (Saleem et al., 2022). We argue for the contextualisation of GCE approaches to ensure their relevance in diverse local community realities, cultures, environments, economic and political spheres (UNESCO, 2014). This is essential in making the greening of the TVET curriculum relevant, practical and transformational in different TVET college curriculum settings (Kaukko & Fertig, 2016; McCoshan, 2022).

Theoretical framework

This paper is guided by Post-humanism theory as a suitable lens to frame it in achieving its objectives. The Post-humanism theory was coined by Ihab Hassan during the European Renaissance over the last two decades, due to the advancement of technology and humans over the manipulation of nature (Bartosch & Hoydis, 2019; Hassan, 1977). Also influenced by the works of scholars like Rosi Bradotti, Donna Haraway, Claire Colebrook and other, post-humanism is a theoretical framework that undermines the relational boundaries of humanism, and advocates for interdependency and interrelatedness amongst humans, non humans and more than humans, and interrogates the traditional Western knowledge frameworks that perpetuates inequalities and injustices (Bartosch & Hoydis, 2019; Cook, 2004; Kopnina, 2019). Post-humanism's main objective is to dismantle humanism's privileges as central to everything, and advocates for building relationalities with non-humans and beyond humans (Krishnannair & Krishnannair, 2021). Post-humanists believe that humanism is anthropocentric, which puts humanity as a central and valuable element above all existence, and a discrimination against other species (Bartosch & Hoydis, 2019; Hassan, 1977). Humanism promotes human or social welfare, and is concerned with environmental, economic, political and ethical choices that unequally support different human groups (Bartosch & Hoydis, 2019).

Central to Post-humanism are collaborativeness, cooperativeness, collectivism, critical thinking, participatory and interdisciplinary, compatible with high-order skills competencies, that are required for the 21st century skills (Bayley, 2018; Krishnannair & Krishnannair, 2021; Sidebottom, 2019). Post-humanists critique the individualistic and isolated approach to education and training, and promote a participatory and collaborative approach that equips individuals with critical and innovative thoughts needed to solve the sustainability and ecological crisis. Therefore, the post-humanism theory also aligns with the Participatory Action Research method used in the paper because the 21st century skills support all entities and render curriculum green by becoming the most significant aspect of Global Citizenship Education, which is about an educational approach to develop student's knowledge, skills, values and attitude required for a more just, peaceful, tolerant, inclusive and sustainable world (Ahmed, 2020; Sidebottom, 2019).

Methods and Design

This paper adopts a qualitative research approach based on critical theory to explore the effectiveness of GCE in improving the greening of the TVET college curriculum. The paper uses a Participatory Action Research (PAR) design that emphasises collaboration among participants and researchers, focusing on co-creating knowledge and promoting meaningful change through collective inquiry. To generate contextually grounded data, the researcher generates data through document analysis, workshops and group meetings (online and face to face).

PAR is a suitable design given its action-oriented, emancipatory and transformational nature (Campos & Anderson, 2021; Zuber-Skerritt & Wood, 2019). Literature posits that PAR is often used interchangeably with Action research, Participatory Research, Emancipatory Research, Critical Action Research and Community Participatory Action Research (Cargo & Mercer, 2008; Pain et al., 2007). Similarly, Selener (1992) asserts that PAR and Action Research have common underpinnings but use distinct approaches that take various forms. Contrary to the previous scholars, MacDonald (2012) views PAR as a subset of Action Research. Kidd and Kral (2005) contend that participation and actions are key components of PAR. Despite the abovementioned views on PAR, in this paper, PAR is regarded as a subset of action research, as PAR shows more linkages to action research itself.

Furthermore, PAR is also introduced as a decolonising process capable of interrogating the master narrative of science, and recognises that the dominant scientific systems marginalise the wisdom of indigenous knowledge. PAR is also problem-solving oriented, by bringing together interested and affected stakeholders from different backgrounds and contexts to solve their problems appropriately (Lawson et al., 2015). Twenty (20) stakeholders, including students, lecturers, campus manager, the Head of Department (HOD), a municipal representative and an environmental education facilitator, who showed interest in contributing to the study, formed part of the researchers (Kemmis & McTaggart, 2007). Convenience sampling was used in the project. Stakeholders where part of one TVET college in Siyabuswa in Mpumalanga Province in South Africa. Siyabuswa is defined as a rural township situated about 120 kilometres (km) North of Pretoria in Gauteng, and 10 km South of Marble Hall town in Limpopo.

The steps of PAR involve a spiral process of repeated circles that guides the process in inquiry and actions, and informs the design of the methods (Loewenson et al., 2014). The steps involve planning, acting and observing the process and consequences of change, reflecting on these processes and consequences, replanning, acting and observing and returning to reflect (Kemmis & McTaggart, 2007). However, in reality, the process might not be linear, where the steps follow each other, in a neat spiral process, but are fluid and overlapping (Kemmis & McTaggart, 2007). Each step is a collaborative spiral of co-participant self-reflection, directed towards studying, reframing, and reconstructing social practices to secure and legitimate changes (Kemmis & McTaggart, 2007). The process is demonstrated below in Figure 1.

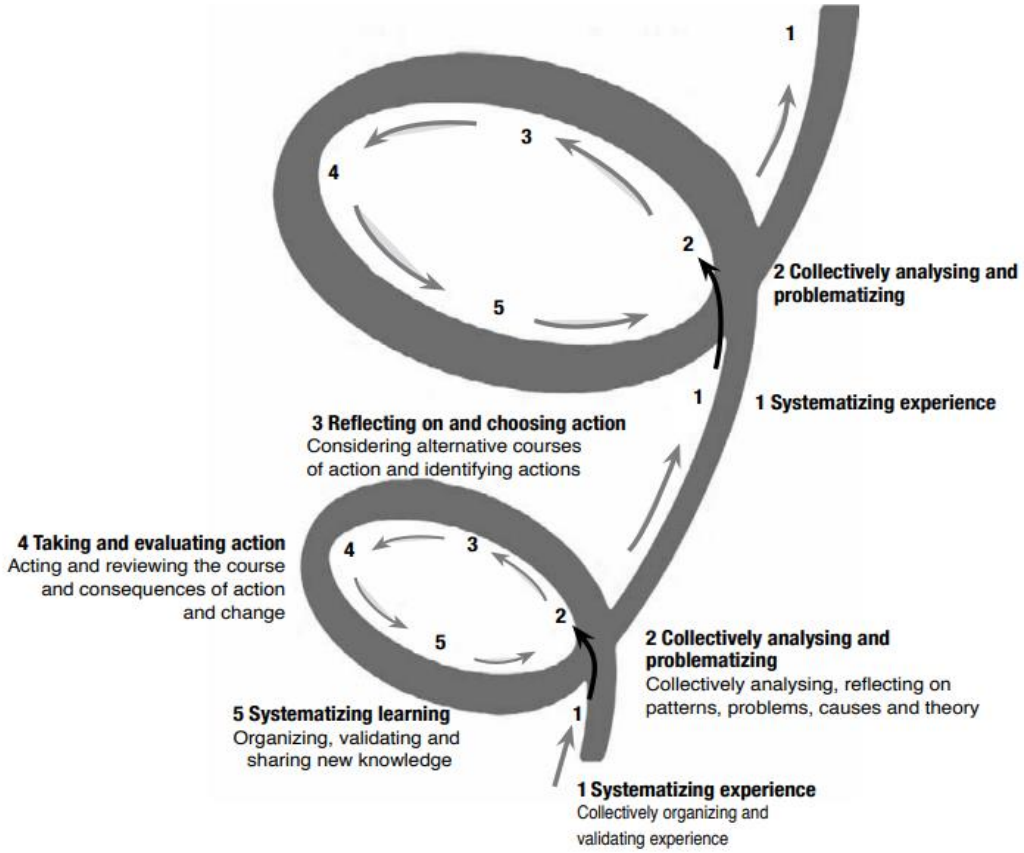

Figure 1: The cyclical and spiral process of Participatory Action Research

The three dimensions of Critical Discourse Analysis (CDA), including the textual discourse analysis, discursive practice analysis and social structural analysis were adopted (Van Dijk, 1993), to uncover the deeper meaning of text that expressed subjective and personal account of co researchers lived experiences on challenges of greening the TVET college curriculum (Fairclough, 2013).

Results and Discussion

This paper aimed to explore the effectiveness of GCE as an approach to improve the greening of the TVET curriculum with a focus on sustainability and a practical, transformative approach. This section is organised and guided by the paper's objectives.

TVET colleges' understanding of the need to green the curriculum

The findings reveal limited knowledge and understanding of the stakeholders on the importance of green curriculum, limiting teaching and learning to teacher-centred approaches. There is also a lack of capacity building and support to enhance stakeholders' limited knowledge to improve teaching and learning approaches. The argument draws from statements like:

'We heard about this eco-greening thing in the meetings, but proper workshops and training are never offered on how to include the recycling programs in the curriculum.'

'By it seems to be a waste of time because it does not form part of the syllabus.'

The text analysis underlying the extracts reveals the social injustices of exclusion, marginalisation, and disadvantage faced by the TVET community (Van Dijk,

2015). TVET colleges in rural and urban areas globally are guided by UNESCO UNEVOC, which encourages the greening of TVET curriculum to equip students with green skills expertise to be compatible with the global labour market and enterprises (UNESCO, 2021). However, such discourse is found to be exclusive, depriving the TVET college community and students of their right to social change and ecological transformation (Fairclough, 2013; Nikolajenko-Skarbalė et al., 2021). The lack of attention to greening of the curriculum is also reported by Li et al. (2023), which led to a shortage of trained personnel on green technology, and subsequently to the slow response to global green technology trends.

Challenges for greening the TVET curriculum

The findings reveal several challenges, including skills mismatch as a result of the absence of green skills competency standard to guide the green curriculum, the lack of a policy framework on greening approaches, green content and program defined by market demands and economic crisis mainly through pilot study and ad hoc approaches (Freimann, 2023; ILO, 2018). The green content also addresses knowledge acquisition, with less focus on the practical aspect of learning (Freimann & Magnus, 2023; OneWorld, 2018). The following discussions underpin these findings:

'Going green is not included in the curriculum. We are doing this other program on our own to save some resources.'

'We just do it without any policy helping us or facilitators.'

'Luckily, in the NCV Electrical Engineering, renewable energy technology is only included in level 3 subjects.'

The above extracts uncover the individualised and disjoined approach to greening the curriculum as an adaptive measure to solve the college's immediate unsustainable resource use and management problems. The approach conflicts with the UNESCO UNEVOC's holistic approach to the greening process (McCoshan, 2022). The approach further denies students and the college community the global citizen rights of access to quality education and training required for employment, decent work, entrepreneurship and lifelong learning as guided by the 2030 Agenda for Sustainable Development (Fairclough, 2013; UNESCO, 2015). Moreover, the approach is exclusive, structured in a solid and siloed way, guiding specific subjects and programs at particular levels. Such hindrances expose the campus to multiple curriculum injustices, inequality, and non-democratic conditions (Naidoo, 2022). Such limitations are also reported in Malaysia, where demands for countries' green industries are not fulfilled because of the frameworks guiding the green curriculum (Zaime et al., 2023).

In one of the workshops held on greening the curriculum, one of the stakeholders (co-researcher) indicated that:

'We have no policy guiding us. We are just trying on our own, for instance, to minimise paper use and recycle scrap metals. We are expected to complete our strategy plan on how we have improved our campuses for climate change.'

The above extract indicates that the concepts related to green practices, such as greening of curriculum, climate change, recycling, minimisation of waste, and saving the environment, demonstrate an awareness and knowledge of greening. However, there are no policy guidelines for implementing such knowledge. It further brings a sense of discouragement to consider the greening program process as a compulsory requirement to be implemented by TVET colleges globally (UNESCO, 2020).

GCE as a relevant approach to greening the TVET college curriculum

The findings uncover the teaching and learning approaches mainly based on knowledge acquisition, with less consideration of its application. The approach seems to build

lower-order content skills, which fail to address and support the comprehensive 21st-century skills, core competencies for global citizens (González-Pérez & Ramírez-Montoya, 2022). The discussion is shown in the extracts below:

'In Business Studies, we just encourage students to save paper and demonstrate how to print both sides. We do the theory part, and student acquires practical skills during their 18 months of Work Integrated Learning (WIL).'

'The WIL is determined by students getting internships, and is not guaranteed.'

'The Department makes provisions for campuses to work with local businesses and companies to identify and include competencies into existing frameworks relevant to their skills needs. We fail because of our rurality; more businesses are centralised in urban areas.'

The language used in the extract shapes the perception of limitations, depriving students and the TVET college community of critical engagements and emancipation (Fairclough, 2013). The green curriculum requires structured learning outcomes beyond teaching and training approaches that only transfer knowledge. Still, also complex competency approaches for solving problems that require creative, critical, innovative, Information and Communication Technology expertise (González-Pérez & Ramírez-Montoya, 2022). Such expertise is compatible with experiential learning approaches such as problem-based simulation or roleplay (Karimi et al., 2023). The system injustices disarm TVET college communities from accessing green content and programs required to empower them to change their ecological situations (Fairclough, 2013; Napathorn, 2022). The system further marginalises students from reaching their full qualification potential to be competitive in the green occupations arena (Fairclough, 2013). The need to address TVET colleges' curriculum social injustices is echoed by Van Wyk and Engelbrecht (2022), who call for the redress, equity, access to opportunities, quality and choices approaches of curriculum that provide quality and real success in education and training.

The evidence of the success of GCE as a relevant approach to greening the TVET college curriculum

GCE was found to be relevant and effective in enhancing the greening of the TVET college. The adoption of PAR design allowed multiple stakeholders to be involved in the project (Kemmis & McTaggart, 2007) and to bring expertise in integrating green concepts and programs into the curriculum (Zuber-Skerritt & Wood, 2019). The project process was democratic and emancipatory (Lawson et al., 2015), by allowing the contextualisation of global green skill knowledge, skills and attitude to be translated to the communities' indigenous knowledge systems on sustainable resources management and use (UNESCO, 2021).

Adopting the project as a GCE, a shift from traditional knowledge transmission to an experimental learning approach successfully integrated the curriculum's theory and practical green content and programs (Cörvers et al., 2016). The project further allowed all the stakeholders to engage in activities, acquiring and contributing their expertise to the call (Budiarti et al., 2021). Developing the framework below is a major success in guiding the greening of the curriculum.

Table 1.1: Curriculum green content and programs

KEY PURPOSE AND UNITS OF COMPETENCE	PERFORMANCE CRITERIA	LEARNING OUTCOME
• Integrated waste management system.	To equip stakeholders with waste reduction, reusing, recycling and recovery competencies.	The ability to identify and employ waste reduction, reusing, recycling and recovery. Waste audit programs. Selling of scrap material for fundraising
• Sustainable water uses and management.	To equip stakeholders with competencies for efficient and improved water quality and use.	The ability to differentiate and justify efficient water management practices and their application. Water harvesting, audit green vegetation, water-saving vegetation, automated taps, and reduced water flushing toilets.
• Sustainable energy use and management.	To equip stakeholders with competencies for improved and efficient energy use and management.	The ability to analyse, design, and apply efficient energy use and management. Energy audit, low-energy cost appliances. Suggested solar panel energy use.
• Biodiversity conservation and management.	To equip stakeholders with knowledge and understanding of biodiversity conservation and management.	Examine, create and support strategies for biodiversity conservation and management. Revegetation, afforestation, green composting, etc.
• Green procurement	To equip stakeholders with competencies to identify products and services that advance sustainable lifestyles and practices.	The ability to examine and evaluate purchases that support green products and services. Green labelling, green purchasing.
• Green transportation	To equip stakeholders with competencies for improved decision-making on the use of sustainable transportation.	The ability to compare and contrast green transportation's benefits and make informed decisions. Lift clubs, cycling, walking.
• Green buildings	To equip stakeholders with innovative and creative competencies to differentiate and support green building infrastructure.	The ability to compare and contrast the benefits of green building and design, as well as adapt the infrastructure.
• Green technology	To equip stakeholders with innovative and creative competencies supporting green technology	Analyse, create and compare technology-aided programs to support green skills. On-screen marking, printing both sides, and the use of smart technologies (NCV IT program)

One stakeholder emphasised the above relevance in one of the meetings.

'To be honest, when we started with this project, I never thought we would get to the stage where we have a concrete program that we will move us from the conventional approaches to the experiential approach like this.'

The above extract confirms the impact and the tools brought by integrating the GCE program to green the curriculum. The stakeholder opens up about his reluctance at the beginning and how working together has assisted them towards the approach that will bring change in the TVET. He seems to acknowledge the program as clear and applicable.

In addition, another stakeholder added to the above discussion by saying she believed the post-humanism also made them see things beyond human, when she said:

'I also agree, but I believe the beyond non-human of integrating ICT in education and training programs had also played a great role in helping us to design the clear and applicable program of GCE.'

From the above, it seems as if the post-humanism assemblage, collaborative and material relatedness of all matters expanded the stakeholders' involvement beyond human agents (Fox & Alldred, 2020; Kioupi & Voulvoulis, 2020; Sidebottom, 2019). Analysing gaps in the curriculum and the international and national policies guiding the greening of the TVET curriculum was a way to include non-human agencies in the project (Barad, 2007). Also, using technology-aided approaches, including YouTube videos on green skills programs and content, and websites to download supporting information, allowed the use of beyond human agencies (Ramli et al., 2020). Above all, the evidence of the project and the available framework review schedule, which is a process for continual improvement, is significant evidence of GCE as an appropriate strategy with observable outcomes (Tsotetsi & Mahlomaholo, 2015).

The document analysis instrument provided a finding on the ecological and sustainability crisis and how it is well responded to by the GCE as a strategy which is operationalised by the Posthumanist lens.

Posthumanism affirms Bronfenbrenner's "ecological perspective, according to this perspective knowing is not about me as an individual knower, but it is about the relationships of knowing which are important. Relationality that pulverises the sanctity of the individual is what is important. Therefore, Curriculum Studies scholars seem to have the responsibility of ensuring that Knowledge or expertise is not resident within individuals, but between them. No one person is guaranteed the status of knower, ad infinitum, but that as the situation demands he may be called in to share his/her idea on any one matter for a given duration of time."

The above provides space as a common value for all knowledges especially in trying to provide necessary tools in combating the ecological and sustainability crisis. A space into which one may come in and get out as and when it is necessary to do so during the process. Curriculum studies scholarship is seen as such a space where more than one knowledge can come together to provide different perspectives regarding the contemporary issues such as ecological and sustainability crisis that is currently looming. The crisis as the planet's vulnerability from human actions that negatively impact the natural, social, economic and political spheres. Ecological crisis, including climate change, land degradation, loss of biodiversity, forced migration, war and conflicts over natural resources, pandemic diseases, to mention a few.

Recommendations

This paper makes the following recommendations to enhance the greening of the TVET curriculum process:

Firstly, the findings reported the lack of capacity development and support for professional development of lecturers and other personnel, as well as financial support. Therefore, the study calls for the lecturers' professionalisation of green skills-related qualifications and continued in-service training to address the growing demands of new approaches to greening TVET curriculum-related programs. More studies should also be

conducted on the importance of financial support for greening programs, focusing on TVET colleges in rural areas.

Secondly, the findings also reveal the mismatch between skills produced at the TVET colleges and the expected green skills required for green jobs due to the absence of a green competency standard. We therefore recommend conducting more studies to explore how green occupational skills are defined and linked to TVET college green content, programs and qualifications.

Thirdly, the findings report on the absence of policies and frameworks to guide the greening of the TVET curriculum. UNESCO UNEVOC provides a holistic framework for the greening of the college, including the development of Green Institutional Policy (IGP), which aligns with international, national, and regional standards (UNESCO). We therefore recommend that studies be undertaken on the availability and effectiveness of IGP to guide the greening of the curriculum.

Fourthly, the report's findings show that the stakeholders can see things beyond humans due to post-humanism. The paper calls for the de-centring of all units to co-exist and benefit from each other. Using non-human aspects enabled the project's success and provided the needed tools and information.

On the fifth point, the findings report on the teaching and learning approaches mainly based on knowledge acquisition, with less consideration of its application. The paper contributes to the body of knowledge of the project as a GCE, a shift from traditional knowledge transmission to an experimental learning approach, successfully integrating the theory and practical green content and programs in the curriculum.

Finally, the findings on the ecological and sustainability crisis. The GCE is seen as a responsive strategy that is operationalised by the Post-humanist lens to provide space for collaboration and different perspective in order to equip stakeholders with different competences as discussed in GCE programme (see table 1).

Conclusion

Adopting GCE as an approach to greening the TVET colleges' curriculum effectively revised the existing curriculum by integrating green skills content and programs. Adopting document analysis was essential to explore the UNESCO UNEVOC holistic greening of the TVET college's practical tool, which guided the development of a green curriculum framework. This further assisted in identifying the need to develop IGP and green competency standards to best guide the college's greening process, addressing the skill mismatch challenges. This was enabled by the Curriculum Studies scholarship provided as a space to accommodate different perspectives and voices in an effort to combat the ecological and sustainability crisis we are facing. The involvement of multiple stakeholders through PAR helped address the capacity development and support challenge. The post-humanism assemblage, collaborative and material relatedness of all matters, expanded the stakeholders' involvement beyond human agents. The workshops, discussion meetings and online material on greening programs allowed the team to contribute their local expertise and further learn how other TVET colleges regionally, nationally and globally respond to the greening program call. The PAR further allowed the continuation of the project as a legacy that extends beyond the timeframe of the research project for further development and transformation of the greening programs.

Disclosures

Conflict of interest

The author declares no conflict of interest

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