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Greening the TVET Colleges in a Posthumanistic Era: The Whole Institutional Greening Approach

Kgaogelo J. Masemene [1] & Makeresemese Rosy Mahlomaholo [2]

[1] Tshwane South TVET College, South Africa.
[2] University of KwaZulu - Natal, South Africa.

ABSTRACT

This study adopted the Whole Institutional Greening Approach as a strategy to strengthen green skills development in one of the TVET colleges in Mpumalanga, South Africa. The study aims to transform the campus' processes, programs, products and services in line with the green paradigm. The study was qualitative and adopted the Participatory Action Research (PAR) methodology. This allowed the interested and affected stakeholders to be involved in all the interactive stages of PAR through document analysis, workshops and discussion meetings. The Posthumanism Theory framed the study to challenge the anthropocentric and individualistic approaches to education and training in the TVET colleges. The multidimensional and multiple-perspective nature of green skills also requires competencies that are beyond Eurocentric approaches to education and training. Posthumanism theory therefore brings central ideas of multiple relationalities, dependency and entanglement of humans, non-humans and beyond-humans entities in education and training. The Three dimensions of Critical Discourse Analysis, including text, discursive, and social structural practices, were used to analyse and interpret data. The major findings of the study were the inconsistent and uncoordinated green skills practices on the campus. This is a result of individualised, fragmented and ad hoc program approaches to green skills development, with no attempt to mainstream and address challenges of implementation. The adoption of the Whole Institutional Greening Approach was effective in addressing the key integrated aspects of the greening processes, including the institution's green policy, green competency framework, the greening of the curriculum, and capacity building and support.

Keywords: *Green skills, Technical and Vocational Education and Training, Participatory Action Research, Posthumanism, Critical Discourse Analysis.*

Correspondence
Makeresemese Rosy Mahlomaholo
Email: QhosolaM@ukzn.ac.za

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INTRODUCTION

This study designs a strategy to strengthen green skills development in one of the TVET colleges in Mpumalanga using the Whole Institutional Greening Approach (WIGA). Green skills are defined as knowledge, attitude and technical skills that promote environmental, economic, and social sustainable enterprises and workplace practices.Furthermore, Green skills involve processes, products and services needed for adaptation and climate change resilience. They promote efficient use of resources, the reduction of greenhouse gases, and the management of natural resources. On the other hand, WIGA is coined as an extension of the Whole Institutional Approach (WIA), adapted to the sustainable resource

use and management context.[1] WIGA is thus defined as a holistic and integrated approach for mainstreaming sustainability through greening the institutions, with the purpose of promoting sustainable behaviour and practices in communities, workplaces, industries and other places where green skills are required.[2]

This study is guided by the research question: How effective is WIGA as a strategy for strengthening the green skills development in the TVET colleges? The study aims to enhance the college's just transition, through integrating the greening strategies into programs, processes, and programs. The main objective of the study is to examine the call for the integrative nature of the WIGA sustainability approach, guided by the United Nations Educational, Scientific and Cultural Organization (UNESCO) International Centre for Technical and Vocational Education and Training (UNEVOC) framework on greening the campus, greening the curriculum, greening the research, greening the community, and greening the institutional culture.[3] The greening process stems from the concept 'green', which was developed as a transformational movement out of the need to address the global intergenerational environmental degradation, and the world climate change crisis.[4] Its main focus is for institutions to adopt sustainable resource use and management strategies to promote sustainable lifestyles and practices.

WIGA as a strategy has been introduced globally by the International Centre for Technical and Vocational Education and Training (UNESCO UNEVOC). UNESCO UNEVOC identified the Technical and Vocational Education and Training (TVET) colleges as the key role players in empowering individuals, organisations, enterprises, communities, and current and future workforces with green skills in line with the evolving demands for green occupations requiring sustainable practices.[5] TVET colleges globally have a historical background of unsustainable extractivist and productivist processes and programs guided by economic and human development policies.[6] Therefore, TVET colleges require extensive in-skilling, re-skilling, and upskilling of existing skills, and upgrading of infrastructure in line with the transition to green growth.[7]

The UNESCO UNEVOC prescripts are in line with the UN Sustainable Development Goals (SDG), which, through education and training, advocate for balanced economic growth to address a range of social needs, through measures that adapt and mitigate climate change and the protection of the environment.[8] Green skills development in the TVET colleges is one of the adaptation and mitigation measures through holistic and integrative approaches, including WIGA.[9] WIGA in this study guided the strengthening of key greening elements, including the development of Institutional Green Policy (IGP), the development of a green competency framework, the greening of the curriculum, and capacity development and support. To operationalise the strategy, PAR is adopted as a design methodology, framed by posthumanism theory.

LITERATURE REVIEW

Although the UNESCO UNEVOC globally provides for WIGA as a framework to integrate green skills in the TVET colleges, most current literature reports the isolated, inconsistent and hypothesis theory testing approaches to the greening process rather than the holistic and integrative ones. Hanieh et al. developed the whole greening system model for higher education institutions, including TVET in

[1] Liz Thomas, "Access to Success and Social Mobility Involves Everyone! A Whole Institution Approach to Widening Participation," in *Access to Success and Social Mobility through Higher Education: A Curate's Egg?* (Emerald Publishing Limited, 2018), 209–24.
[2] Andrew McCoshan, *Greening TVET and Skills Development: A Practical Guidance Tool* (Turin: International Labour Office, 2022), https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_emp/@ifp_skills/documents/publication/wcms_847095.pdf.
[3] Andrew McCoshan, "Greening TVET and Skills Development: A Practical Guidance Tool," n.d.
[4] Daniele Conversi and Mark Friis Hau, "Green Nationalism. Climate Action and Environmentalism in Left Nationalist Parties," *Environmental Politics* 30, no. 7 (2021): 1089–1110.
[5] UNESCO, *UNESCO-UNEVOC Medium-Term Strategy for 2021–2023* (International Centre for Technical and Vocational Education Training, 2021), https://unevoc.unesco.org/pub/UNEVOC_MTS-III_EN.pdf.
[6] Simon McGrath and Jo-Anna Russon, "TVET SI: Towards Sustainable Vocational Education and Training: Thinking beyond the Formal," *Southern African Journal of Environmental Education* 39 (2023).
[7] McGrath and Russon, "TVET SI: Towards Sustainable Vocational Education and Training: Thinking beyond the Formal."
[8] McGrath and Russon, "TVET SI: Towards Sustainable Vocational Education and Training: Thinking beyond the Formal."
[9] UNESCO, *UNESCO-UNEVOC Medium-Term Strategy for 2021–2023*.

Palestine, to assess the level of green actions and social behaviours in the institution.[10] Also, Holst, et al., developed a Whole Institutional Approach (WIA) scale as a tested and validated instrument.[11] The purpose was to measure the experience of students and educators in sustainable learning. The above literature relied on quantitative data restricted to measuring and comparing isolated aspects of the strategies, rather than a qualitative approach to provide a holistic and integrated view of the strategies.

Further, Manyati, et al., explored four case studies of complex skills ecosystems in both formal and informal public and private TVET colleges of Gulu and Hoima in Uganda, and Durban and Alice in South Africa.[12] The studies were carried out through the collaborative projects approach with the aim of determining how the colleges balance the dynamics of employability and sustainability concerns. In all cases, no indication of the use of the WIGA strategy has been used to support the transition toward social justice and environmental sustainability. This study agrees with the literature on the lack of research on greening and sustainability strategies in the TVET colleges education and training globally.[13] Langthaler et al., stress the need for a sustainability transition by introducing new strategies for transformative learning.[14] This study therefore contributed to the identified gap by adopting WIGA as a strategy to strengthen green skills development with a focus on the development of IGP, green competency framework, greening the curriculum, and capacity building and support.

The need for IGP development is supported by a study undertaken in Germany, where activities to develop green skills are embedded in the larger context of ESD rather than in TVET college policies and frameworks.[15] Green skills development is framed by industry market demands in Uganda, carried out on an ad hoc project and pilot approach by organisations affected by green growth in Zimbabwe, and partnerships with other countries and departments in South Africa, with no evidence of coherent and consistent green skill policy development to coordinate the programs.[16] The need for green competencies in the college competency framework is supported by several studies. Bianchi, et al. developed sustainable competency modules for entrepreneurial programs, which led to comparative and centralised programs with a minimum improvement of green skills development in France.[17] Malaysia emphasises the great need for a green competency framework to address skill mismatch.[18] Its absence negatively impacts the enhancement of green teaching and learning through the digital library in Kenya.[19] The adoption of Work Integrated Learning (WIL) and simulation programs is also found to contribute to skills mismatch in South Africa. The global need for the greening of the curriculum is highlighted in China, where the absence of green content in the curriculum negatively impacted the initiatives for training in green occupations.[20] Green skills content is introduced as a standalone module only to raise awareness of sustainable development in Mauritius. In Uganda, green content programs are defined by the curricula of particular courses and job profiles, not green competencies to be learnt.[21]

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[10] McGrath and Russon, "TVET SI: Towards Sustainable Vocational Education and Training: Thinking beyond the Formal."
[11] Jorrit Holst, Julius Grund, and Antje Brock, "Whole Institution Approach: Measurable and Highly Effective in Empowering Learners and Educators for Sustainability," *Sustainability Science* 19, no. 4 (2024): 1359–76.
[12] Tarisai Kudakwashe Manyati et al., "Exploring the Potential for Enhancing Green Skills Training, Innovation and Sustainable Livelihoods in Informal Spaces of Harare, Zimbabwe: Identifying Gaps and Opportunities," *IIMBG Journal of Sustainable Business and Innovation* 2, no. 1 (2024): 60–79.
[13] Manyati et al., "Exploring the Potential for Enhancing Green Skills Training, Innovation and Sustainable Livelihoods in Informal Spaces of Harare, Zimbabwe: Identifying Gaps and Opportunities."
[14] Margarita Langthaler, Simon Mcgrath, and Presha Ramsarup, *Skills for Green and Just Transitions. Reflecting on the Role of Vocational Education and Training for Sustainable Development. ÖFSE Briefing Paper 30*, 2021.
[15] CEDEFOP, *Vocational Education and Training in Germany – Short Description* (Publications Office - European Union, 2020), https://doi.org/doi/10.2801/329932.
[16] Xavier Edziwa and Sylvan Blignaut, "Graduate Employability Skills: The Voice of Agricultural Technical Vocational Education and Training (ATVET) Students in Zimbabwe," *South African Journal of Higher Education* 36, no. 2 (2022): 99–114.
[17] Francesca Arnaboldi et al., "Women in Science: Where We Stand?—The WHEN Protocol," *Education Sciences* 15, no. 4 (March 25, 2025): 408, https://doi.org/10.3390/educsci15040408.
[18] Adib Farhan Zaime et al., "A Green Skills Framework for TVET Curricula," *International Journal of Innovative Technology and Exploring Engineering* 9, no. 3 (January 30, 2020): 2532–34, https://doi.org/10.35940/ijitee.B7276.019320.
[19] Rose Muthoni Mukundi and Wanjiru Njuki, "Enhancing Green Learning and Training in TVET Institutions through Digital Libraries in Nyeri County, Kenya," *Africa Journal of Technical and Vocational Education and Training* 4, no. 1 (2019): 13–23.
[20] Jiaman Li, Kangyin Dong, and Xiucheng Dong, "Green Energy as a New Determinant of Green Growth in China: The Role of Green Technological Innovation," *Energy Economics* 114 (October 2022): 106260, https://doi.org/10.1016/j.eneco.2022.106260.
[21] Ronald Mutebi and Hosea Kiplagat, "TVET Response to Global Challenges of Sustainable Development," *African Journal of Research in Mathematics, Science and Technology Education* 7 (June 1, 2022): 447–56, https://doi.org/10.2022/ajest.v7i1.783.

South Africa reports the failure of policies and support bodies to strengthen initiatives for the greening of the curriculum.[22]

THEORETICAL FRAMEWORK

The holistic and integrative nature of WIGA, and the relatedness and interdependency of green skills, deemed posthumanism as a suitable theoretical framework to operationalise this study. Posthumanism theory is centred around relationships and relatedness amongst matters.[23] It is grounded on the episteme belief that knowledge and reality are not separate entities, but reality is understood through knowledge that is embedded in all matters in the process of becoming.[24]

Its definition draws from both the post-humanism and post-anthropocentrism principles that question the humanism supremacy, exceptionalism and representational ideas of 'Man' as an alleged measure of all things.[25] Posthumanism interrogates such humanist ideas of inequality, which accelerated the overexploitation of natural resources, resulting in environmental degradation and the world's climate change crisis. Posthumanism views humans as embodied and embedded in environmental, economic, technological and political agencies in an interactive state, assembled in a strong sense of relationality, collectively in a co-existing state of becoming.[26] The agencies are differentiated but evolving, continuously shaping each other.[27] Effective green skills development requires such intra-active and co-existing relatedness to respond to environmental crises, support green growth infrastructures, and develop green policies and adaptations to green technologies in a continuum process.[28]

Literature contends that education and training, including the TVET colleges, are grounded in the humanistic isolated, hierarchical, and binarised worldview, viewed as a human potential and excellence tool, with anthropocentric approaches that undermine the interconnectedness of human, nonhuman, and beyond-human entities.[29] Posthumanism, therefore, argues for holistic interdisciplinary education and training approaches that support the rethinking of policies, curriculum, pedagogies, assessments, and resource uses, and capacity building. The posthuman ideas best guide WIGA as a strategy in this study to strengthen the development of IGP, green competency framework, greening of the curriculum, capacity building, and support, which are core elements of the greening process. The posthumanism interrelatedness and interdependence of all matters is further in congruent with PAR methodology. PAR believes that green skills development is not only centred around humans but in policies, curriculum awareness-raising campaigns, conservation, and sustainable resources use programs, to name a few.[30]

METHODOLOGY

PAR is adopted as one of the qualitative methodologies, to map out and operationalise WIGA in strengthening green skills development. PAR is found to be relevant given its participatory, democratic approach, and problem-solving orientation.[31] PAR believes that TVET college communities, through interaction and collaboration with other stakeholders, are best suited to identify problems affecting the

[22] Kirsten Freimann and Gerda Magnus, "Skills for a Just Transition to a Green Future: Measuring the South African TVET System and Providing Input to Support Its Development," in *International Research Conference on Skills for a Just Transition* (Johannesburg: Centre for Researching Education and Labour, University of the Witwatersrand, 2023), 1–10, https://aspyee.org/sites/default/files/2024-04/paper Skills for a Just Transition to a Green Future final.pdf.
[23] Carol A Taylor and Annouchka Bayley, *Posthumanism and Higher Education: Reimagining Pedagogy, Practice and Research* (Springer, 2019).
[24] Çağdaş Dedeoğlu and Nikoleta Zampaki, "Posthumanism for Sustainability: A Scoping Review," *Journal of Posthumanism* 3, no. 1 (2023): 33–57.
[25] Rosi Braidotti, "Posthuman Critical Theory," *Critical Posthumanism and Planetary Futures*, 2016, 13–32.
[26] Braidotti, "Posthuman Critical Theory."
[27] Taylor and Bayley, *Posthumanism and Higher Education: Reimagining Pedagogy, Practice and Research*.
[28] Christina T. Kwauk and Olivia M. Casey, "A Green Skills Framework for Climate Action, Gender Empowerment, and Climate Justice," *Development Policy Review* 40, no. S2 (October 12, 2022): 1–19, https://doi.org/10.1111/dpr.12624.
[29] Kwauk and Casey, "A Green Skills Framework for Climate Action, Gender Empowerment, and Climate Justice."
[30] Kemmis Stephen and McTAGGART Robin, "Participatory Action Research: Communicative Action and the Public Sphere," *Handbook of Qualitative Research*, 2000, 559–603.
[31] D. Nelson, " Participatory Action Research: A Literature Review," January 17, 2017.

effective development of green skills and develop strategies best suited to solve such problems.[32] This makes PAR an emancipatory process, as it brings TVET communities to equally and collectively contribute knowledge and expertise to WIGA's strategy for strengthening green skills development. PAR consequently dismisses concepts such as participants and researchers and regards everyone as co-researchers working collaboratively with common interests of strengthening green skills.[33]

PAR is also a transparent process rather than the end of a product. It is presented in a process of non-linear spiral of planning, acting, reflecting, and replanning of the cycle, building on each other.[34] PAR is therefore a transformative process mirrored by its successful output. This is important to determine the credibility and trustworthiness of the study, as the main objective of PAR is the successful improvement of people's lives.[35]

Initial Planning Phase

A co-researchers' team was established, which included the campus manager, head of departments, lecturers, students, community representatives, local business representative, municipal representative, environmental education practitioner, curriculum adviser, Environmental Education Centre and Wildlife Environmental Society of South Africa (WESSA) representative and security officers. From the team, the steering committee was established as a major requirement of the greening process.[36] The action plan was developed for short, medium and long-term objectives.[37] The plan guided the co-researcher's responsibilities, resources, time allocated for activities, monitoring, and evaluation programs. Methods for data generation were identified, including document analysis, discussion meetings, workshops, training, pictures, and videos.

The Action Phase

Documents, including international, regional, national and institutional policies and frameworks discussed, were analysed to guide the development of IGP. Through the guidance of a WESSA representative, environmental education practitioner and curriculum adviser, guidelines for sustainable resource use and management were identified and included in the IGP. The option of greening the existing campus competency framework was agreed upon.[38] Green competency was organised through functional performance areas that specify the expected knowledge, skills, attitude, and behaviour required to strengthen the green skills needs, based on the college context.[39] Functional areas, including integrated waste management systems, sustainable water resources use and management, sustainable energy use and management, biodiversity conservation and management, green procurement and green buildings and green technology form part of the green competency.[40] The 21st century skills competencies, including problem-solving, critical, creative and innovative thinking, collaborative and communication competencies, required for competitive individuals in their everyday lives, were also integrated into the functional performance areas.[41]

The interdisciplinary approach of greening the curriculum was adopted, which enabled the green skills competencies to be distributed across college programs, disciplines and departments. Performance competency areas include waste reduction, reusing, recycling and recovery competencies and waste audit, improved water quality use methods, improved energy efficiency and management; improved biodiversity management strategies; green purchasing and labelling practices; improved transportation methods and improved technology-aided programs. Training and learning approaches

[32] Ortrun Zuber-Skerritt and Lesley Wood, *Action Learning and Action Research: Genres and Approaches* (Emerald Publishing Limited, 2019).
[33] Zuber-Skerritt and Wood, *Action Learning and Action Research: Genres and Approaches*.
[34] Zuber-Skerritt and Wood, *Action Learning and Action Research: Genres and Approaches*.
[35] Robin McTaggart, Helen Henry, and Evelyn Johnson, "Traces of Participatory Action Research: Reciprocity among Educators," *Educational Action Research* 5, no. 1 (March 3, 1997): 123–40, https://doi.org/10.1080/09650799700200021.
[36] McTaggart, Henry, and Johnson, "Traces of Participatory Action Research: Reciprocity among Educators."
[37] Flora Cornish et al., "Participatory Action Research," *Nature Reviews Methods Primers* 3, no. 1 (2023): 34.
[38] Cornish et al., "Participatory Action Research."
[39] Cornish et al., "Participatory Action Research."
[40] Cornish et al., "Participatory Action Research."
[41] Maria José Sá and Sandro Serpa, "The COVID-19 Pandemic as an Opportunity to Foster the Sustainable Development of Teaching in Higher Education," *Sustainability* 12, no. 20 (2020): 8525.

that include problem solving, project learning, inquiry-based, and case studies, were also included in the performance criteria to guide the learning outcomes.[42]

Through the assistance of a WESSA representative and environmental education practitioner, workshops, training and discussion meetings were held to capacitate the researchers on green skills content and approaches for content integration. Awareness-raising and team-building programs were held to support the training and motivation programs. Through the assistance of local business representatives, fundraising and donation programs were established to provide financial support for the strategy.

The Reflection Phase

The researchers critically reflected, evaluated and monitored the effectiveness of the strategies developed and implemented in the action phase. This is generally done to identify the areas of success, failures, threats and the need for improvement.[43] This phase involves continuous refining, restructuring, and redesigning strategies for the required changes. This process is carried out with the belief that in PAR interaction, solutions are tried and tested and that the problem can be solved over time.[44]

Data Analysis

Critical Discourse Analysis (CDA) was adopted to analyse, interpret and report written, recorded and visual data. The three-dimensional analysis includes text and language, discourse practices, and socio-cultural practices.[45]

Text and language

The dimension analyses and intepretes text to explore the more profound meaning of sociocultural practices beyond what is presented by the sentence structure.[46] The actual meaning of their interaction in the greening process with other stakeholders, communication, and expressions are revealed in their hidden meaning of transcribed data.[47]

Discursive Practice Analysis

Discursive practices explore how language and communication shape social realities, identities and social dynamics in terms of power.[48] It reveals how power operates within language, highlighting who has the authority to speak and whose voices are marginalised.[49] In the context of this study, the understanding of how language shapes green skills development policies, perceptions and practices was explored. The extent to which the non-human agencies' voices were heard and presented was also considered.[50]

Socio-cultural Practices

The social structure analysis involves the social arrangements of text and relationships developed based on cognitive ideologies of people in positions, influencing others' reasoning, interpretation, discussions and learning in a particular social context.[51] The CDA in this study explores and brings an understanding of green skill development discourses in a critical and integrative approach that uncovers hidden power domination and oppressive discourses through PAR and WIGA, as neutralisation and transformative approaches.

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[42] Sharon Bramwell-Lalor, "Nature of Science: Examining Science Teachers' Knowledge and Their Instructional Practices," *Australian Journal of Teacher Education (Online)* 48, no. 1 (2023): 74–91.
[43] Julio Daniel Selener, *Participatory Action Research and Social Change: Approaches and Critique* (Cornell University, 1992).
[44] Selener, *Participatory Action Research and Social Change: Approaches and Critique*.
[45] Teun A. Van Dijk, "Critical Discourse Analysis," in *The Handbook of Discourse Analysis* (Wiley, 2015), 466–85, https://doi.org/10.1002/9781118584194.ch22.
[46] Van Dijk, "Critical Discourse Analysis."
[47] Norman Fairclough, *Critical Discourse Analysis: The Critical Study of Language* (Routledge, 2013).
[48] Van Dijk, "Critical Discourse Analysis."
[49] Fairclough, *Critical Discourse Analysis: The Critical Study of Language*.
[50] Tony Young and Peter Sercombe, "Communication, Discourses and Interculturality," *Language and Intercultural Communication* 10, no. 3 (2010): 181–88.
[51] Young and Sercombe, "Communication, Discourses and Interculturality."

Ethical Consideration

The approval for conducting the study was obtained from the relevant departments and institutions. The researchers consented to participate by signing a consent form. The questions of confidentiality, anonymity through the use of pseudonyms, the purpose and procedures of the research process, the right to participate or withdraw from the study at any time were also consented to. The safety of the research documents was also agreed upon.

PRESENTATION OF FINDINGS AND DISCUSSIONS

The findings and discussions are presented based on the objectives of the study. The findings and discussions guided the recommendations made in the study. This study adopted WIGA as a strategy to strengthen green skills development in South African TVET colleges. The study is guided by the UNESCO UNEVOC TVET colleges greening practical guide to address the need for the development of IGP, the development of a green competency framework, the greening of the curriculum, and capacity building and support.

The Need for the Development of Institutional Green Policy

The findings revealed the absence of a coherent and consistent IGP that guide the greening process. The available policy was developed for a particular department to address the individualised high consumption of printing papers problem identified. This is contrary to the international guidelines framing IGP development at the colleges that encourage the mainstreaming of green skills across systems and programs through WIGA.[52] The absence of IGP uncovers the social injustices of exclusion, marginalisation, and disadvantage faced by the college and its communities.[53] From the PAR perspective, IGP development requires the involvement of different stakeholders with an interest in the greening call.[54] Its absence prevents the college from accessing the knowledge and expertise of competent and relevant stakeholders on greening matters. This also becomes a limiting factor for the campus to produce students who are competitive to meet the global demands for green growth. From the posthumanism perspective, the findings further reveal the complexity of centralised power. Traditionally, competencies for policy are viewed as inherited in certain individuals and represented as human power, performed through boundaries, exclusion and practices above other humans, nonhumans and beyond human agencies.[55]

Given the above findings, the researchers, with the guidance of international policies and greening the TVET colleges' practical guide, developed the IGP. This supports what posthumans perceive as the reality of the co-creation of knowledge. The power of knowledge, skills, and expertise to develop the IGP was assembled by multiple stakeholders from different backgrounds, international policies, websites, libraries, and aspects of green growth included in the IGP, to name a few, in a state of becoming by continuous review of the policy for continuous improvement. The approach dismantled the humanistic supremacy and hierarchical management orders as the sole policy developers and objectified lecturers, students, and communities as end users and implementers of policies.[56]

The availability of IGP would also address the individualised and isolated approach to the greening process, by providing a consistent and coherent framework for mainstreaming greening programs, services and processes across the college. The availability of IGP would further address the injustices, marginalisation, and exclusion in social, economic, environmental and technological agencies. It would emancipate the college community to acquire green skills and competencies to meet the global demands for green growth.

[52] Young and Sercombe, "Communication, Discourses and Interculturality."
[53] Young and Sercombe, "Communication, Discourses and Interculturality."
[54] Young and Sercombe, "Communication, Discourses and Interculturality."
[55] W Appadoo-Ramsamy, "A Posthumanist Re-Reading of Teacher Agency in Times of Curriculum Reform," *South African Journal of Higher Education* 37, no. 5 (2023): 100–111.
[56] Appadoo-Ramsamy, "A Posthumanist Re-Reading of Teacher Agency in Times of Curriculum Reform."

The Need for a Green Competency Framework

The findings reveal the patches of the green competency framework to guide green skills competencies to be acquired. In South African TVET colleges, the WIL and simulation approaches are adopted to address the practical aspect of learning programs. However, the strategies are ineffective as the programs are obsolete and do not meet the green occupational needs required in green jobs and economies. Where green competencies are included, they are isolated with no evidence of practical skill acquisition. This was evident in one of the discussions when Mr. Mukubi confirmed the following.

> *Again, we do not have any guidelines for green competencies*. Only *the NCV department has the renewable energy technologies subject at level 3. Students are expected to acquire the below competencies.*

The extract demonstrates the isolated and limited approaches to the inclusion of green competencies in the TVET college competency framework.

Mr Mukubi provides further clarification:

> *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 above extract illuminates the socio-economic impacts of developing a green competency framework. It demonstrates the underprivileged experience of TVET colleges in accessing resources and services to improve their education and training. Guided by the developed IGP, UNESCO UNEVOC practical guide, the below green competency framework was adopted to identify elements of greening the available competency framework.

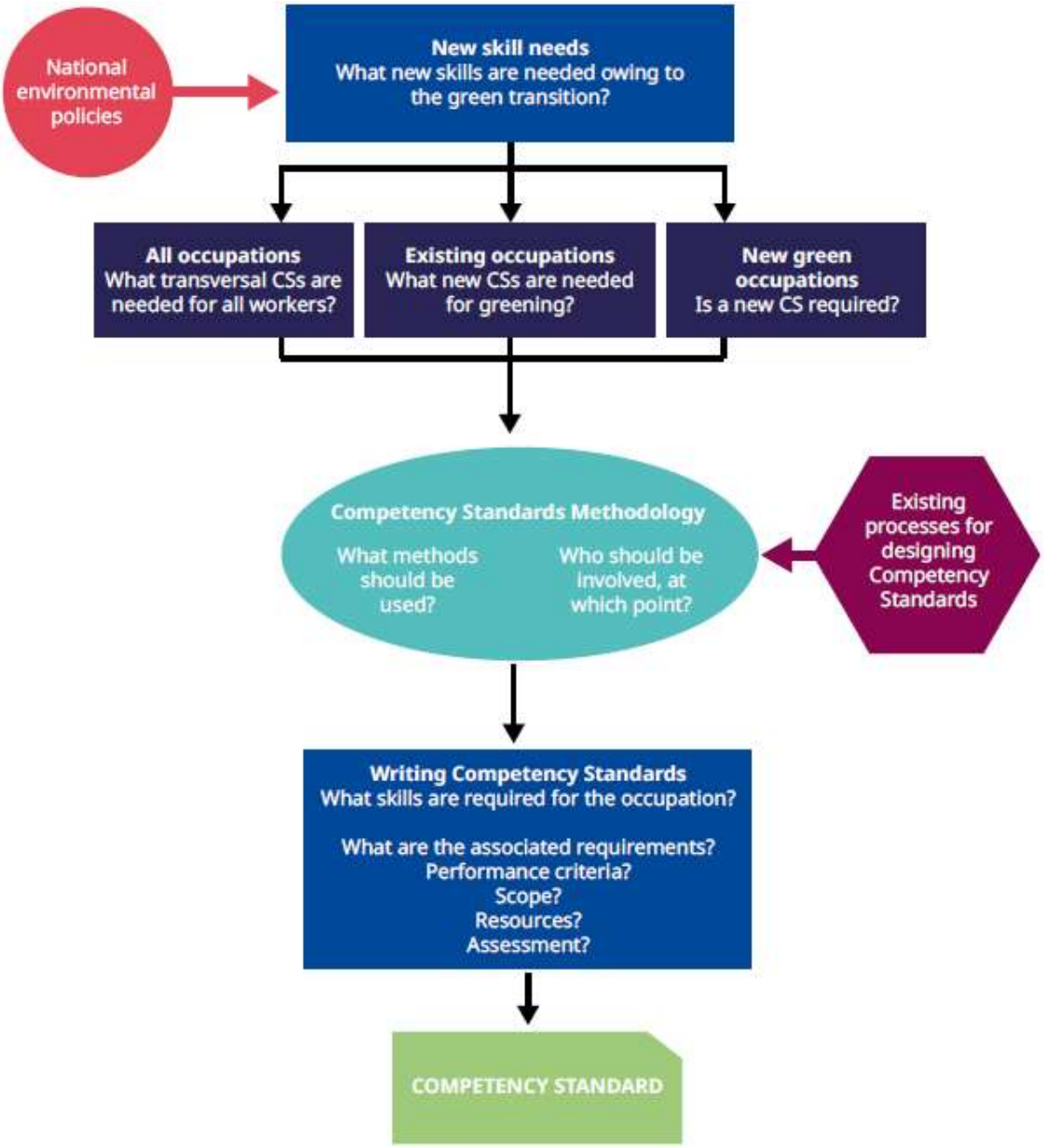


Figure 1: Competency Framework Process (Source: McCoshan, 2022)

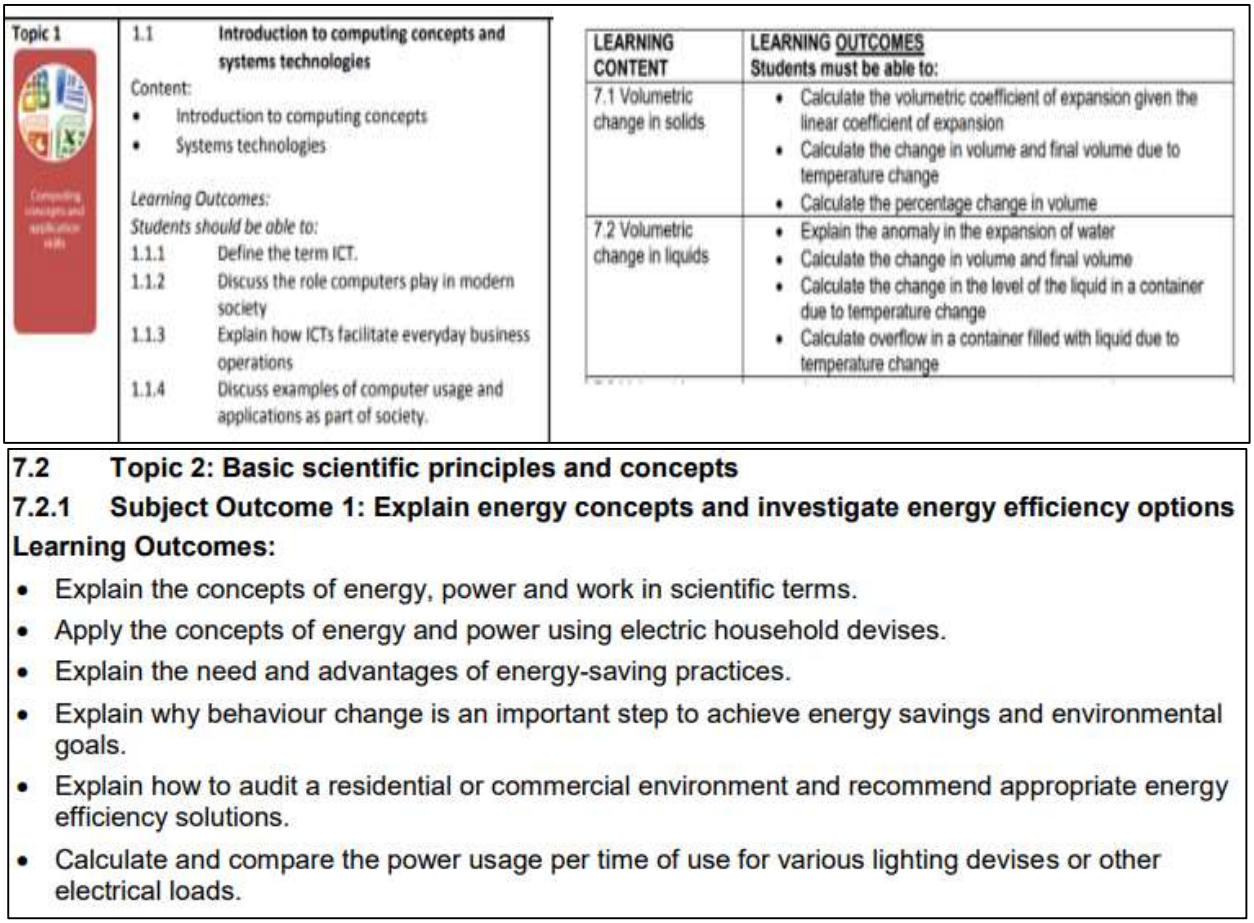
From the above framework, knowledge, skills and values required for green competencies were identified according to the needs of the college. They were organised according to their key purpose, functional areas, a unit of competence, elements of competence, performance criteria, and the evidence of performance.[57] The availability of a green competency framework would guide the mainstreaming of green skills competency across the campus programs, close the poverty gap between rural and urban TVET colleges, and address the skill mismatch by providing students with green competencies required for green growth and occupations.

The Need for Integrating Greening the Curriculum

The greening of the curriculum is important in translating the needs identified and included in the green competency framework into curriculum content, programs and assessments. In South Africa, DHET guides the integration of green skills into existing curricula by providing new greening content,

[57] Appadoo-Ramsamy, "A Posthumanist Re-Reading of Teacher Agency in Times of Curriculum Reform."

programs, projects and training.[58] Although such provisions are made, the findings of this study confirm the isolated green skills content in the curricula. This is evident from the extracts below:



Topic 1

1.1 **Introduction to computing concepts and systems technologies**

Content:

- Introduction to computing concepts
- Systems technologies

Learning Outcomes:

Students should be able to:

1.1.1 Define the term ICT.

1.1.2 Discuss the role computers play in modern society

1.1.3 Explain how ICTs facilitate everyday business operations

1.1.4 Discuss examples of computer usage and applications as part of society.

LEARNING CONTENT	LEARNING OUTCOMES Students must be able to:
7.1 Volumetric change in solids	• Calculate the volumetric coefficient of expansion given the linear coefficient of expansion • Calculate the change in volume and final volume due to temperature change • Calculate the percentage change in volume
7.2 Volumetric change in liquids	• Explain the anomaly in the expansion of water • Calculate the change in volume and final volume • Calculate the change in the level of the liquid in a container due to temperature change • Calculate overflow in a container filled with liquid due to temperature change

7.2 Topic 2: Basic scientific principles and concepts

7.2.1 Subject Outcome 1: Explain energy concepts and investigate energy efficiency options

Learning Outcomes:

- Explain the concepts of energy, power and work in scientific terms.
- Apply the concepts of energy and power using electric household devises.
- Explain the need and advantages of energy-saving practices.
- Explain why behaviour change is an important step to achieve energy savings and environmental goals.
- Explain how to audit a residential or commercial environment and recommend appropriate energy efficiency solutions.
- Calculate and compare the power usage per time of use for various lighting devises or other electrical loads.

Figure 2: Report 191 and NCV Curriculum (Source: DHET, 2019)

The above extract reveals the absence of green skills content in the Report 191 program curriculum, and some patches of green skills content in the NCV program curriculum. This is emphasised in the statement below.

> *Luckily in the NCV Electrical Engineering renewable energy technology level 3 subject is included in the curriculum as presented below:*

This demonstrates the inconsistency and uncoordinated approach to greening the curriculum in the TVET college. This promotes the Cartesian cut education and training approaches that build boundaries around departments, programs, and subjects. This further denies students and campus communities the right to social, economic, environmental, and technological opportunities required for a global green transition.

The availability of a green competency framework made it possible to translate the knowledge, skills, and values into learning outcomes.[59] The practical organisation of the learning outcomes also provided the college context-based integration of sustainable resource use and management content and programs into the curriculum. The whole process of greening the curriculum was a success through the relationship of partnerships with organisations such as WESSA, for their assistance in the development, organisation, and meaningfulness of green skills topics, contents and programs.

[58] Appadoo-Ramsamy, "A Posthumanist Re-Reading of Teacher Agency in Times of Curriculum Reform."
[59] Appadoo-Ramsamy, "A Posthumanist Re-Reading of Teacher Agency in Times of Curriculum Reform."

The need for capacity building and support

Green skills are newly introduced in the TVET colleges globally and are referred to as 21st-century skills.[60] Therefore, they require the upgrading of skill of personnel and the upgrading of infrastructure compatible with green growth. It is evident from the findings that capacity building is offered on an ad hoc and fragmented basis to address individualised green skills development challenges. This is based on the extracts below:

> *The solar installation was a short course training, some things were included in the subject guideline, but we are not yet trained on them. There is a need for a qualification because the course is still new.*

The above extract emphasises the need to professionalise green skills-related qualifications and continued in-service training to address the growing demands of new approaches to green skills-related programs. Also, the socioeconomic conditions of the college led to minimal efforts in programs to support green skills development because of a lack of financial resources.

> *With waste management, we are putting posters in computer classrooms to raise awareness of green printing among students, but we do not have funds for running big programs like campaigns, as advised.*

As such, a capacity-building and support plan was developed, which outlined workshops, training and discussion programs, and resources required to support the programs.[61] The plan guided the in-service program to support campus personnel in the greening processes. Awareness-raising campaign programs were also developed in partnership with organisations such as WESSA and local businesses to provide financial support through donations and fundraising.[62]

RECOMMENDATIONS

The study recommends that further studies be undertaken using different research methods to contribute knowledge to the global call of greening TVET colleges from the South African context.The study has demonstrated the importance of the availability of a coherent and consistent IGP at the campus, as an essential tool for modelling the campus greening processes. Therefore, the study recommends that DHET make the availability of IGP a priority, as part of SDGs 4.7.; 8.3 mandate to support the development of ESD and the infrastructure of sustainable lifestyle and practices.

The study revealed the importance of the availability of a green competency framework to guide green skill competencies and the greening of the curriculum and methods. Therefore, the study recommends that DHET adopt the green competency-based framework to address skill mismatches.

The participation of multiple stakeholders has been a great success of this study. The study encourages TVET colleges to form partnerships with organisations such as WESSA to support their eco campus-initiated program, which aligns with SDG 13.3 for learning and improving education for sustainable development, awareness raising, and institutional capacity development from global best practices.

Lastly, the study strongly recommends that the DHET develops financial support systems for the greening of the TVET programs, with much consideration given to TVET colleges in rural areas where opportunities for local fundraising and donations are limited.

CONCLUSION

This study has demonstrated great success in adopting WIGA as a strategy to effectively strengthen green skills development in the TVET college. The success implies that WIGA could be used in other institutions to support green skills programs. It has proven to hold great potential as a catalyst for the greening of the TVET colleges, especially in South African TVET colleges, where graduates lack skill

[60] Appadoo-Ramsamy, "A Posthumanist Re-Reading of Teacher Agency in Times of Curriculum Reform."
[61] McCoshan, *Greening TVET and Skills Development: A Practical Guidance Tool*.
[62] Tendai Gwatidzo and Witness Simbanegavi, *Building a Competitive and Dynamic Green Industrial Sector in South Africa after COVID-19* (Economic Research and Statistics Department, South African Reserve Bank, 2021).

competencies, including green skills compatible with the green labor market. By integrating the four key pillars of the greening process, WIGA has successfully guided the development of IGP which provided a framework for embedding green skill content and programs across college departments. The strategy, therefore, successfully contributed to the global call for redesigning education and training towards sustainable behavioural change and transformative mindset shifts, in addressing climate change and achieving the just transition to green growth.

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ABOUT AUTHORS

Dr. K.J. Masemene, is a lecturer at Technical and Vocational Education Training (TVET) College in Gauteng. South Africa. She completed a Teacher's Primary Education Diploma in 1995, a Bachelor of Education degree in Environmental Management in 2009, and a Bachelor of Honours degree in Environmental Management in 2012. She pursuit her Masters Degree of Education in Environmental Education completed in 2021, and her PHD in Social Sciences completed in 2024. Her research interest

include Curriculum studies, Geography, Environmental Education and Management, and Climate Change Education. Her current research involves developing strategies for strengthening green skills development with the focus on TVET colleges.

Makeresemese Rosy Mahlomaholo has a PhD is Curriculum Studies where she advances boundaries of knowledge around what is termed critical accounting education. To date as a lecturer, she uses transformation as the backdrop against which she paints the tapestry of her research. She is currently focusing on Green Accounting, Posthumanism and the Fourth Industrial Revolution with its attendant concepts of Adaptive Learning, block chaining, use of sensors and sophisticated mathematical algorithms has taken her to new heights.