

# Greening TVET for Sustainable Development: A Path to a More Sustainable Future

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## Abstract

The study investigates the potential for directing TVET to suit the demands of a more environmentally and sustainably oriented future. As the "master key" to promoting lifelong learning and addressing poverty, TVET policy and implementation must be focused on the development of sustainable practices that are required to reduce its environmental effect while also meeting labor market needs. The paper addresses concepts such as green employment, sustainable development objectives, green TVET practices, and measures to improve TVET sustainability in the future in order to meet forthcoming global concerns. Furthermore, it analyzes the interaction between economic growth and environmental responsibility, promoting a comprehensive strategy to integrate ecological awareness into the fundamental aspects of vocational training. The objective is to develop a workforce that possesses both technical expertise and a strong ethical commitment to sustainability principles. This will contribute to the growth of a more environmentally friendly economy and a society that is better equipped to handle challenges.

**Keywords:** Green Jobs, Sustainable Development, TVET, Environmental Impact, Labor Market

## Introduction

The global epidemic has shown the perils of unchecked economic development and environmental abuse. A new strategy for development is needed to address the urgent issues of deforestation, resource depletion, climate change, and waste. To achieve real sustainability, we need more than just technology and money. Instead, we need to combine environmentally friendly tools with a skilled labor force (Nyangweta & Reinsch, 2019). Only by working together in peace can we create a future that can support everyone. New and environmentally friendly technology can't be implemented without a trained workforce and engineering technicians (Li et al., 2023). Institutions of technical and vocational education and training (TVET) provide crucial information for adjusting to technological change in particular settings. Vocational education has evolved throughout time to include new technology and teach students about current trends in the industry. Organizations throughout the world, including UNESCO and the World Bank, have acknowledged TVET's value in national development. According to UNESCO, TVET is "the learning process that integrates theoretical knowledge with hands-on experience and contextual understanding in a variety of economic

and social contexts." The academic community has come to appreciate TVET for the special contribution it makes to long-term sustainability. Thus, VET is crucial to socioeconomic growth with an emphasis on the greening agenda, and it is highly valued in the strategic and operational goals of G20 nations (Nyangweta & Reinsch, 2019). The relevance of education and training in creating a sustainable future is best shown by the contributions made by vocational education and training, which show the connection between technology and human abilities (Jules, 2015).

Green development is an all-encompassing idea that requires cross-sector collaboration and participation. Agriculture, management, research and development, manufacturing, and services are just some of the sectors that have been making strides toward a green economy in recent years thanks to the "two-carbon" approach. Because of this shift, new technical sectors and green employment needs have arisen, highlighting the importance of education and training, especially in the form of vocational schools, in easing the way toward environmentally responsible, equitable, and sustainable economic expansion (Li et al., 2023). Vocational education, as one of the most essential types of education for social and economic growth, plays a pivotal role in green skills education. Therefore, it is crucial for vocational schools to play a pivotal role in advancing green technology and reducing the adverse effects of industrial operations on the environment.

### **TVET and the Green Technology**

Technical and skilled professionals must be educated now and tomorrow to help transition from carbon-intensive to carbon-light technologies, processes, and behaviors. Despite the alarming degradation of the planet's natural resources, forests, and livelihoods, schools in both developed and developing countries have not paid enough attention to incorporating green technology skills, expertise, and training into their curricula, research, or services. This negligence has hindered our capacity to react to global and green technology developments and left us short on green technology personnel. TVET institutions must promote green creative ways and technology to lessen the environmental impact of commercial and industrial activities. Academics of different backgrounds think green technology is the answer to balancing human and environmental requirements. Green technology uses and creates systems, processes, products, and technologies to conserve natural resources and decrease human impact. Green technology emphasizes long-term commercial and economic viability. By balancing social and environmental concerns. Some of the methods used fall under the headings of "environmental protection" and "resource conservation," and they include things like "recycling," "green purchasing," and "reducing greenhouse gas emissions." "Green jobs" or "green careers" need expertise in the tools, skills, knowledge, and worldview that underpin environmentally friendly practices. Therefore, training in green technology should be a standard part of the curriculum at all vocational institutions. In this way, students may get the understanding and skills they need to safeguard the planet and advance the cause of sustainable living (Lamichhane, 2016). Green technology education has been found to boost students' confidence in STEM fields, as well as their employability, problem-solving abilities, understanding of sustainable development, and capacity to start their own businesses (Nyangweta & Reinsch, 2019). Vocational education has a good opportunity to advance green skills as a kind of education intrinsically related to economic and social progress. Because of this, it is the duty of technical universities to advance green technology education in an effort to lessen the industry's negative effects on the environment. A growing body of research suggests that green technology should be

included into vocational education programs, including curriculum, instruction, study, and service delivery, to better prepare today's and tomorrow's workers to be good stewards of the environment.

Liu and Lin (2016) observed that their research with 37 tourism majors from 10 Chinese vocational schools found that educators there did not devote enough time to green education. Students and teachers at a Malaysian TEVT college came to the same conclusion as those polled by (Affandi, 2019). The majority of respondents felt that all facets of vocational education benefit from emphasizing environmental awareness and incorporating green skills into curricular and co-curricular activities, from product selection to technology use. Teachers' perceptions of green competences and their integration into the curriculum at Indonesia's agricultural vocational schools were studied by (Mukhidin, 2020; Nyangweta & Reinsch, 2019). Based on the findings, it is clear that educators know very little about green skills outside the realm of the environment. Still, they all agreed that teaching eco-friendly practices to pupils was crucial (Li et al., 2023). Despite this consensus, however, agricultural vocational schools did not include a section on the value of green skills in their curricula. Tang (2021) concurred that the evolution of environmentally friendly technologies is in its infancy, and that advancements in environmentally friendly vocational education have been slow due to a lack of understanding among all parties involved, an insufficient development base, and a dearth of research results. Xu and Li (2019) noted the difficulties in educating green talents to satisfy the needs of the manufacturing industry's transition and upgrading (Li et al., 2023).

### **Education for Sustainable Development and TVET**

UNESCO came up with the term "ESD" to describe an approach that would combine educational principles with established methods for fostering sustainable development (Ramli et al., 2018). ESD stresses cultural shifts that embrace the ideas of sustainable development, fosters a future-oriented, anticipatory mindset, increases awareness of global interconnectedness, and more. Instead of doing nothing in the face of these threats, ESD works to equip people on every continent with the resources they need to actively and responsibly influence their future. ESD poses many intriguing issues, such as how we may learn from the experiences of people in other nations, how we can create new lifestyles that prioritize human and environmental health, and so on. The goal of TVET for sustainable development is to rebrand TVET so that it is no longer perceived as a "mere supplier" of skilled labor to industry (Lamichhane, 2016). Majumdar (2009) suggests concentrating TVET training on the "6R" concepts of reuse, reduction, renewal, recycling, repair, and rethinking to bring these ideas together and assure the field's continued success. In addition, it rests on the shoulders of these three ideas: Changing from a "industry as usual" to a "sustainable growth approach" in resource utilization is the first pillar of sustainability; the second is ensuring that all people, irrespective of their socioeconomic standing, have access to the goods and services they need; and the third is ensuring that all people have their basic needs met.

### **Status of GT in TVET Institutions**

UNESCO's 2011 International Consultation Meeting in Bonn called for a green qualification that links the economy to employment creation. The economy and TVET must be well-connected for this to happen. This backdrop explains why TVET systems struggle more than workplace programs. Additionally, even without extensively reviewing educational requirements, it is feasible to determine the minimal green skills needed for diverse careers in most cases. This set of competences includes saving energy and resources, managing

waste, and understanding how one's job affects nature. Also, the ability and willingness to assume personal responsibility for one's own actions within the limits imposed by one's employer or line manager, as well as the knowledge and awareness of ways to avoid risks by acting successfully at work. Implementing environmental and resource protection plans, programs, and regulations requires enough labor to develop, install, and operate environmentally friendly and efficient technology and processes. In many countries, a shortage of skilled professionals hinders the growth of green technologies. That implies we're not maximizing climate change efforts (Ramli et al., 2018). Thus, buildings seldom fail energy efficiency criteria. TVET is crucial to green economic and sustainable development, thus government and private TVET institutions will confront substantial obstacles. Micro-level environmental and resource training programs are ideal for introducing sustainable protection principles. Practice-qualifying vocational schools might show if young and elderly need to be promoted and taught particular skills to contribute to social transformation (World Bank, 2012b). Vocational schools that satisfy the standards would emphasize sustainable development, environmental protection, and resource conservation. They would no longer be an afterthought, a problem handled by a few devoted educators and trainers, or a marginal issue addressed by isolated initiatives (Africa Development Bank Report, 2012). However, issues remain in the education sector, including curricula and greening TVET, capacity development, facilities and infrastructure (equipment, devices, and laboratories), integration of training institutions, and coordination. Along this journey, business will face hurdles including (1) understanding of green technology, (2) a scarcity of it, and (3) tax incentives.

### **Transforming TVET to a More Sustainable Direction**

Majumdar (2009) found that TVET's involvement in developing the workforce for resource generation, re-creation, and transformation is closely linked to sustainable development policy reforms. This establishes TVET's role in supporting UN green economy proposals. The examples in the preceding section illustrate that Asia-Pacific governments and organizations are taking huge efforts toward a green economy via deeper links and a better grasp of its breadth and methods. TVET must play a vital role in this program since it provides skills and training to the rising workforce (Nyangweta & Reinsch, 2019). The International Forum on TVET in Hangzhou, China, on November 17-19, 2008, highlighted the "paramount necessity" of TVET enhancement and urged for specific actions to make TVET a catalyst to change the region's massive people resources. Instead of this call, it sent these suggestions:

- TVET should foster political commitment from national governments to play a crucial role in education supply.
- Continuously improve the image, values, and attitude towards TVET.
- Implement TVET reforms based on UN MDGs and Education for Sustainable Development.
- TVET should prioritize lifelong learning and knowledge upgrading in the context of fast technological innovation.
- Foster stronger international partnerships and public-private initiatives between TVET and industry.
- Emphasize competency-based TVET to promote individual learning, relevance, and resource efficiency.
- Encourage entrepreneurship and training to enhance knowledge growth.
- Encourage networking between TVET institutions and other nations in the area to promote institutional growth.

- Organizations like UNESCO-UNEVOC will help fulfill TVET reform and growth demands.

This is one of the regional answers to make TVET viable, but it has to be greener. Thus, the Colombo Plan Staff College, an inter-regional institution for human resource development in Asia-Pacific, has led the way in greening TVET via the “Green CPSC Program”. The institution seeks to replicate the green campus strategy based on the five TVET greening pillars.



Figure 1: The Five Pillars of Greening TVET (Setiawan, 2017)

The CPSC with its international partners IVETA & InWENT from Germany held a TVET for sustainable development conference in Manila in the Philippines on November 2-3, 2010. This program has shown how TVET’s environmentally sound trajectory can help it provide more sustainable human resources to the green economy by incorporating financial, cultural, and social considerations. Finally, the 39-nation delegates recommended the following green TVET practices:

- Suggest prioritizing ESD integration in TVET globally.
- Promote a green TVET framework for sustainable development.
- Develop policies and strategies for ESD integration in TVET systems.
- Support efforts to establish ESD integration capability.
- Integrate ESD into TVET programs and teacher training across all grades and disciplines.
- Sixth, promote ESD via media such as seminars, conferences, and workshops.
- Foster multi-stakeholder collaboration for green TVET development
- Promote evidence-based ESD in TVET research, monitoring, and evaluation
- Develop green economic initiatives in clean technologies and environmental protection
- Invest more in youth education to ensure long-term sustainability, emphasizing trainer capacity development (Schröder, 2019).

### Challenges: TVET for a Greener Economy

TVET helps advance sustainable development (SD), but it is still primarily associated with providing skilled labor to industries, limiting its ability to meet sustainable development strategies. The concerns include transforming TVET toward a green economy while respecting 6R: Reduce, Reuse, Renew, Recycle, Repair, and Rethink. Due to the ongoing evolution and adaptation of the modern world to dynamic lifestyle and perspective shifts, TVET curriculum

must incorporate green economy principles for sustainable development (Schröder, 2019). This requires the development and reinvention of methods to incorporate these ideas into education or spread green economy principles across technical topic disciplines (Setiawan, 2017). McKeown et al (2002) list SD obstacles as

- Raising awareness: Green economy importance
- Integrated Sustainable Development into TVET Curriculum
- Explored Multifaceted Concept
- Promoted International and Regional Collaboration
- Employed Conventional Disciplines in Transdisciplinary Framework
- Improved Teacher Educator Competence in Sustainable Development Education
- Developed and Used Educational Materials and Resources
- Encouraging Popular Culture Sustainability in TVET Schools

According to the latest DESD mid-review, the following areas require attention

- Integrating sustainable development (SD) into TVET curriculum.
- Enhancing teacher educators' sustainable development knowledge and abilities.
- Developing educational resources for teaching and studying sustainable development.

### **Conclusion and Recommendations**

Transforming TVET into a more sustainable choice raises awareness, promotes technical development, and facilitates the transition from "brown jobs" to "green jobs." TVET, as a leader in this field, should embrace the Green Jobs Initiative in order to train a qualified labor force to keep the economy humming. There have been several accomplishments, notably in the Asia-Pacific area. This means that those in charge of implementing TVET, making policies, and providing money must meet or surpass expectations in order for the green economy to thrive. TVET has been shown to significantly contribute to environmental progress. Training and education for greening economies and businesses must include all educational levels. Environmental education has a crucial role in raising consciousness at the elementary school level. A variety of demands in technical and vocational education as well as higher education have arisen in response to the recent global goal for green development. Education and training systems need to take an integrated perspective of possible possibilities and limits for green projects in order to react comprehensively to the demands of economies making the transition to green economies. An interdisciplinary strategy considers how various learning contexts might best address certain skill sets. A highly qualified and creative workforce and talent pool is essential to attaining sustainable inclusive economic development, and this necessitates an effective green framework, laws, and practices (Setiawan, 2017). Strategic initiatives for 2021-2023 for UNESCO-UNEVOC will focus on mainstreaming solutions to climate change in TVET. The goals are to strengthen the ability of TVET institutions, create green action plans, and promote advocacy platforms on TVET and climate change. To help institutions move forward with implementing their greening strategies, UNESCO-UNEVOC will begin coordinating potential support via targeted technical assistance in 2022.

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