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Foreword

Across the globe, countries are facing challenges due to increasing environmental degradation and climate change. This requires a systematic approach to changing job opportunities and skill demands as new industries and job profiles emerge. TVET institutions need to be responsive to these dynamics to produce a workforce that matches the actual market requirements and that is aware of its responsibility to protect the environment. The importance of greening technical and vocational education and training (TVET) is highlighted in the Shanghai Consensus UNESCO Member States reached at the 3rd TVET Congress in Shanghai in 2012, which recommends enhancing the relevance of TVET by including *"education for 'green' economies and 'green' societies as part of TVET qualifications and programmes, and advance the 'greening TVET' agenda towards low carbon and climate-resilient growth and development"* (UNESCO, 2012). It is therefore no surprise that UNESCO-UNEVOC together with its global network has made the topic of greening TVET one of its key priorities for 2013-2014 and beyond.

An earlier virtual conference on the topic, which followed soon after the Shanghai Congress in 2012, concluded that greening vocational curricula and training methods should have consequences for the training of TVET teachers and trainers. Participants agreed that new education programmes need to be designed or existing ones adapted, emphasizing that new green qualifications should meet market requirements and provide young people with employment opportunities.

The second virtual conference was moderated by Dr. Julia Kastrup. Dr. Kastrup is an expert for education for sustainable development and works as a Research Associate for vocational education and training for sustainable development at the University of Hamburg (Germany). Dr. Kastrup moderated in collaboration with Dagmar Winzier, who works as a programme expert at UNESCO-UNEVOC.

Attracting 186 participants from 66 countries, the discussion focused on building a deeper understanding about qualifications needs and implementation strategies, and provided the opportunity for participants to exchange experiences and approaches for the implementation of greening TVET.

The UNEVOC e-Forum was established in 2003 to facilitate knowledge exchange and has since become a global online community of more than 3,200 TVET experts taking part in crucial discussions on TVET-related issues. Virtual conferences were introduced in 2011 to encourage wider debate and understanding. Guided by an expert in the field, these discussions seek experiences, expertise and feedback and wish to inspire people to take further action.

We would like to thank Dr. Julia Kastrup for sharing her expertise and developing this synthesis report, which we hope will be useful for your work. We furthermore extend our sincere gratitude to all participants who shared their experiences on the topic and contributed to the development of this report.

Shyamal Majumdar
Head of UNESCO-UNEVOC International Centre

Introduction



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Technical and vocational education and training faces a number of challenges, including technological and societal changes, exemplified by changes in demography, rapidly changing labour markets, persistent social inequalities and conflict. These changes require people to possess skills that are adaptable to the changing nature of work and to new emerging jobs. At the same time, serious concerns about climate change, environmental degradation and scarcity of resources place great pressure on TVET to develop skills and competencies that pave the way towards a green economy and society.

The 2004 Bonn Declaration¹ stated the need for greater efforts to advance TVET and ensure its role in promoting sustainability. The Declaration stressed the importance of TVET within the context of 'sustainability industries' such as environmental conservation, cultural heritage site preservation and renewable energy production. Since then, the concept of "Greening Technical and Vocational Education and Training (GTNET)" has been introduced to further highlight the need for a holistic approach. The term comprises ecological and environmental aspects, as well as economic and social ones. It should be considered that the process of "greening" or "sustainable development" (SD) cannot always deal with

¹ http://www.unevoc.unesco.org/fileadmin/user_upload/pubs/SD_BonnDeclaration_e.pdf

all these three dimensions at the same time. During UNESCO's Third International TVET Congress held in Shanghai in 2012, it was recommended to "include education for 'green' economies and 'green' societies as a part of TVET qualifications and programmes, and advance the 'greening TVET' agenda towards resilient and low-carbon growth and development" (UNESCO, 2012, p. 2).

GTNET has to play a decisive role in respect of these challenges. Given that green transitions affect entire TVET systems, it is particularly necessary to provide "teachers and trainers with up to date knowledge on environmental issues and on green technologies – education and training which deals with the preparation of teachers and trainers should be one of the first priorities in skills response strategies" (Strietska-Illina et al. 2011, p. 11). This statement is also emphasized by the result of the previous virtual conference on GTNET for sustainable development in November 2012, which concluded that greening vocational curricula and training methods has consequences for the training of TVET teachers and trainers. The participants unanimously agreed that new education programmes need to be designed and existing ones to be adapted to focus on learning to learn, developing emotional, social and spiritual intelligence, as well as strengthening competencies to understand and exercise collective learning (see UNESCO-UNEVOC, 2013, p. 14). "Green" skills and knowledge have to be implemented and applied in theory and practice. These new green qualifications should fulfil market requirements and especially help young people to become and remain employed. The lack of qualified workers can already be felt in certain job profiles. In the Cedefop paper "Future skill needs for the green economy" it is stated for example (see Cedefop, 2009) that a green economy needs emerging skills and changing qualification in jobs for renewable energies and skill profiles in environment and

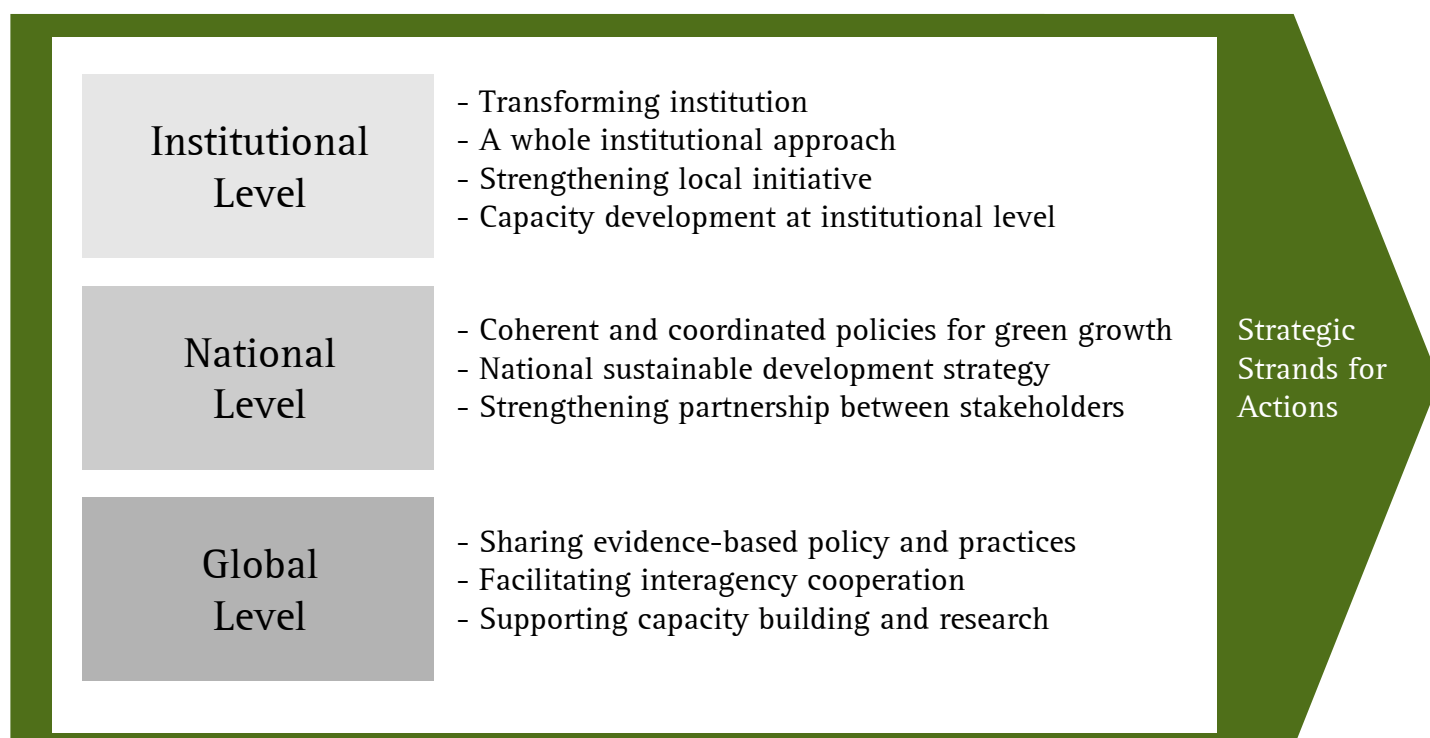
eco-innovations. The International Labour Organization (ILO)'s green job initiative², which shows implications for skills development and sustainable development, has outlined that "the key to curbing skills shortages is a forward-looking approach, having a vision of the opportunities and challenges ahead and anticipating the skills need of the economy to reap potential benefits [...] and address the challenges [...] wisely" (Sanchez & Hofmann, 2009, p. 13). In a concluding statement (see Szovics et al., 2009, p. 90 ff), it is stated that generic skills hold equal importance as specific skills for the green economy. These skills are not entirely new skills, but rather often an add-on or amalgamation of existing skills. There is a need to develop the skills base for each mitigation technology, whether in terms of renewable energy generation or energy and resource efficiency. Concerning curriculum development, a revised curriculum should provide the necessary knowledge needed for mitigation technologies. These mitigation technologies can for example include hydropower, solar, wind and bioenergy, and waste management.

The studies of ILO and Cedefop focused on renewable energy and resource efficiency in the technology sector. However, achieving a green economy also means that other sectors such as the handicraft and the agricultural sector have to be taken into consideration.

The greening process has to be backed up by all relevant stakeholders on an institutional, national and global level (three-tier approach, see Fig. 1). For this purpose, close dialogue and cooperation between all actors of the education system is necessary.

² The Green Jobs Initiative is a partnership established in 2007 between the United Nations Environment Programme (UNEP), the International Labour

Figure 1. A three-tier approach to greening skills (source: Majumdar, 2011)



In 2010, UNESCO pointed out that teaching and learning for a sustainable future will enable teachers and trainers to empower their students and trainees to develop and evaluate alternative visions for a sustainable future. Therefore, UNESCO called upon "working creatively with others to help bring their visions of a better world into effect" (see UNESCO, 2010).

Scope and objectives of the virtual conference

As presented in the introduction, there are different views and needs associated with GTVET. From 12 to 26 November 2013, 185 participants from 65 countries intensely discussed this topic during the two-week virtual conference "GTVET – Qualifications needs and implementation strategies", held on UNESCO-UNEVOC's e-Forum.

The objective was to gather knowledge, experience and ideas to identify the need for further action and support in both practice and

theory. The focus was placed on occupational qualification needs for GTVET, including curriculum development and implementation strategies. The online discussion followed four threads, tackling the following issues:

1. Qualifications needs
2. Curriculum development
3. Implementation strategies
4. Communication and support

Each thread is summarized in section 3 of this report.

In addition to the discussions on the e-Forum, a live WebEx session was held, where ten e-Forum members discussed the challenges of implementing and developing GTVET. The most important results of this live session are also included in the summary of the four main discussion threads.

All main findings and promising practices that emerged during the virtual conference are summarized in the report, including replies to the welcome message and closing message. In addition, a summary of the presentation on GTVET in Tanzania, which was

prepared for the WebEx video conference, is attached as an annex to this report. Conclusions concerning the need for further action have been drawn and a number of outstanding issues are also illustrated.

The moderators would like to thank the e-Forum members for their valuable contributions and active participation in the virtual conference.

Summary of the discussions

In this section, the key points made in the discussions during the conference are summarized, based on the four topic threads outlined in the introduction.

Qualifications needs

In the context of discussions on qualifications needs, it was of special interest to the participants to determine how green skills and knowledge can be integrated into vocational education and training, and which are the most relevant skills that will be needed in the future.

The main concerns dealt with the question of how to integrate green skills into the teaching and training programmes of companies, TVET schools and training centres in the short term. To reach this objective, appropriate methods and means have to be developed. During the virtual conference, some projects were presented to show how sustainable development (SD) can be integrated in different occupations while also highlighting the benefit of SD skills and knowledge.



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A participant representing Plan International in Asia and the Research Base presented a study entitled "Green jobs research³". This project is carried out in Indonesia, Thailand, Vietnam and Myanmar. Taking into consideration the different levels of awareness of green issues, the programme develops and provides trainings that will enable young people and students to adapt their jobs and livelihood to the challenges of climate change. The programme aims to integrate green and climate change adaptation skills into youth employability programmes. The methods used to carry out the study include mapping of climate change adaptation (CCA) and youth employability programmes, interviews and focus groups with young people, governments and NGOs in these countries and the evaluation of existing literature on the subject. The first results of the study revealed that there is still a lack of environmental awareness and that the terms climate change *adaptation* and climate change *mitigation* are often tangled⁴. Nevertheless, the study showed that the young people have a good understanding that green skills have to be integrated in all working areas and that the integration of green skills into curricula and training programmes might increase employability, especially for young people. Furthermore, the implementation of green qualifications into the working place might lead to a more responsible and sustainable attitude of the work force and have a positive impact on the company's competitiveness.

Another example presented was the decision-making and career guide to technical and vocational training for a green economy entitled "It's time to work" (UNESCO Windhoek, 2013). This guide was developed by the UNESCO Windhoek Office, Cluster Office to Angola, Lesotho, Namibia, South Africa and Swaziland, in close cooperation with a local NGO. The guide targets secondary education learners and provides information that will help them make decisions about their potential

³ <http://www.unevoc.unesco.org/e-forum/PLN001-Interim-Report.pdf>

⁴ See for definitions, the glossary of the Intergovernmental Panel on Climate Change (IPCC), http://www.ipcc.ch/pdf/special-reports/srex/SREX-Annex_Glossary.pdf

careers in TVET, particularly in terms of contributing to a green economy. Although this guide does not describe qualifications in detail, relevant qualifications aspects are mentioned whenever it refers to jobs in a green economy. In this case, respective duties and activities of a green profession are introduced, which allows drawing some conclusions concerning knowledge and skills on a more generic level. Apart from these examples, efforts of integrating green skills into training programmes remained sparse and not very evident, particularly in formal TVET.

It was pointed out that the lack of examples could be explained using the outcomes of a study by the ILO (Strietska-Illina et al., 2011), which found that:

- employers still have a lack of knowledge on green skills, and therefore do not require green skills or qualifications from their employees;
- the demand for such green skills is still not well established, except in some environmental awareness aspects, which are also limited to the hotel industry sector;
- most youth employability programmes still tend to focus on increasing employment and employability rather than supporting the greening of jobs/industries/economies; and
- the countries studied have national action plans in place as a framework for integrating climate change education, but vary in the priority they give to green skills development.

Curriculum development

Within the thread "Curriculum development", the discussion especially focused on the following questions:

- How can education planners, teachers and trainers assess the fields of work involved in GTVET?
- How will they decide what are the relevant learning objectives related



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to green issues and how will they apply these learning objectives?

- How can they integrate green concepts into the curricula of TVET schools and work-based training? What are specific linkages for the implementation of GTVET?

Some examples were provided to demonstrate curriculum development by implementing SD skills and knowledge.

The co-moderator presented the project "Vocational training for sustainable development in the food sector and in home economics"⁵, which was carried out by the Institute of Vocational Teacher Training at the University of Applied Sciences in Münster, Germany, from 2010 to 2013. Due to the timeframe, the focus was placed on communal feeding with the three main areas of business, care and education. Food in this sector is provided in public offices, hospitals, schools, universities and other (public) venues, for example. Communal feeding is an emerging sector with high economic potential. The curriculum developed is a good example of how to implement sustainable development into different occupations in the food sector in a comprehensive and easily applicable way. It is now part of teachers' training at the University of Applied Science in Münster and is being applied in several TVET schools and TVET colleges. The methodology used to develop the core curriculum consisted of a combination

⁵ https://www.fh-muenster.de/ibl/projekte/IBL_BBNE/Berufliche_Bildung_fuer_eine_nachhaltige_Entwicklung_Startseite.php

of analyzing existing curricula and examining typical working processes in the sector of communal feeding and home economics. By doing so, it was possible to identify significant learning and working situations that were highly relevant for sustainable development. Curricular analysis has been carried out for the following occupations: cook (m/f), specialist in the hospitality service industries (m/f), □home economist (m/f), □restaurant specialist (m/f) and □professional caterer (m/f).

As the curricula analyzed did not contain the term "sustainable development", related terms such as "ecology", "environment", "social equity", "economy" and "health aspects" were taken into account, e.g.:

1. "Considering qualitative, economic and environmental aspects at procurement" (learning field 2);
2. "Knowing about the hygienic, economic and environmental importance of appropriate storage" (learning field 3); and
3. "During the preparation process of food: keeping in mind the relevance of high-quality food and beverages for a healthy diet" (learning field 4).

The existing curricula contain several important aspects of sustainable development, although these are predominantly fragmented. Connecting these to form a comprehensive curriculum is the basis for recognizing interdependencies within the food system and finding solutions. To become successful, the new curriculum must also link more strongly to the central points of sustainable feeding (see Mattausch, Strassner & Ketschau, 2012).

Antonius Schröder from Sozialforschungsstelle der Universität Dortmund sfs/Dortmund Technical University presented the project "Greening Technical Vocational Education and Training (GTVET)"⁶. Supported by the EU lifelong learning programme LEONARDO and coordinated by Dortmund Technical University together with steel companies, research institutes and strategic partners from Poland,

⁶ See Eurofer – The European Steel Association 2011 and forum contribution: <http://www.gt-vet.com/>



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Italy, UK, Belgium and Greece. This project aimed at exploring how TVET pathways meet environment, health and safety skill needs, which are key for global competitiveness and the sustainability of all European industries. The pilot project developed industry-driven European sustainable training modules in correspondence with national VET systems. A partnership of steel companies and research institutes from each participating member state aimed to identify and anticipate the impacts of environmental legislation on the everyday work of mechanical, industrial and electrical technicians for today and the future. Independently of the different VET systems of Member States, VET practices and learning outcomes need to be evaluated with respect to environmental skills, expertise and awareness. Based on these insights, a European training module was developed to obtain identical European learning outcomes in the field of green skills and sustainable awareness (for example, focusing on preventing pollution and securing occupational health and safety), complementing current technical VET programmes in this area. The module was

tested within four steel companies in the United Kingdom, Poland, Italy and Germany. Adjustments for each national system of VET have been made and learning outcomes have been evaluated in order to obtain transferable credit points (ECVET). Using the example of the steel industry and the VET of industrial, mechanical, electrical and electronic technicians, these modules, and the process of implementation, could possibly be adapted and transferred to other technical VET professions or production industries. The results obtained in this project (module development and process of implementation) could serve as a blueprint for updating and implementing green competencies into the VET system training for new skills focused on meeting industry-driven requirements for environmental sustainability in an immediate and responsive way.

While the following examples brought forward by the participants do not represent a complete curriculum, they show how green skills and topics can be integrated into training programmes:

With different sites in Canada, the "Group Collégia"⁷ provides continuing training and is also active internationally. The organization develops innovative training projects for vocational training centers, as well as technical and technology transfer into countries abroad. The projects cover topics such as sustainable development, climate change and food security.

The project YESdigital⁸ is a Europe-wide initiative that strives to improve the use of information and communication technology (ICT) in VET schools, mainly by using a problem-based learning methodology that integrates ICT tools and devices, such as digital video and social networks. At the same time, the project aims to attract VET students' attention to the concept of a green economy by offering online courses in the field of sustainable energy.

Implementation strategies

Essential questions in the context of GTVET include how it can be successfully implemented and whether greening competencies can be made obligatory for TVET. On the one hand, many projects on GTVET provide excellent results in terms of applying green skills in occupational practice, workplace-based training or teaching and learning processes. On the other hand, a systematic approach to integrating green (occupational) qualifications in the TVET system is still lacking. To implement green competencies into training programmes and curricula and to adapt TVET systems to make them "greener", participants concluded that it might be helpful to have a look at the ICT sector. New qualifications have been launched successfully to provide the workforce with adequate skills and knowledge. New green skills for green jobs could be integrated into training programmes and curricula in a similar way.

Participants expressed that governmental or administrative bodies should launch regulations or laws to offer a strong incentive

for the economy to support the greening process at the national and regional level. At the policy level, having state laws or legislative instruments that provide incentives to support the greening process and greening of economies is considered a starting point. Establishing frameworks for modifying or developing curricula and programmes would ease its implementation in TVET institutions. Due to continuous technological development, it is relevant to find short-term ways to integrate green skills that address the need of companies, and raise awareness of greening processes among the staff.

Furthermore, participants shared their opinions and ideas on how to implement GTVET at the institutional level. Some participants suggested implementing a database of "green" TVET institutions. This could help TVET practitioners and professionals to recognize the role of TVET in promoting sustainable development. Indeed, it is more likely that educational leaders will consider implementing obligatory green TVET policies and programmes if there is a strong perception that GTVET graduates will have better chances on the labour market.

In the course of the discussion, it was suggested that TVET professionals should identify the necessary criteria and establish green indicators to evaluate TVET institutions. This could lead to the development of measuring tools to assess GTVET institutions. To become a green company or institution that can undergo evaluation criteria, it would be necessary to have some guidelines for the greening process. These guidelines should also include information on work processes that have to be supported by management as well as staff.

The moderator shared the following information with the participants to provide some ideas on the GTVET topic, which – at least for quite a few of the participants – was a rather new topic that they had not been dealing with so far.

⁷ <http://www.collegia.qc.ca>

⁸ <http://www.youyesdigital.eu>

Strategy	Content	Further information
Renewed EU Sustainable Development Strategy (2006, Europe)	<ul style="list-style-type: none"> • A single, coherent strategy on how the EU will more effectively live up to its long-standing commitment to meet the challenges of sustainable development, • Identifies and proposes actions to enable the EU to achieve continuous improvement of quality of life both for current and for future generations, • States different objectives (e. g. environmental protection, social equity and cohesion, economic prosperity) and principles (e. g. promotion and protection of fundamental rights, solidarity within and between generations, open and democratic society), • Includes key challenges, such as climate change and clean energy, sustainable transport, sustainable consumption and production, conservation and management of natural resources, public health, social inclusion, demography and migration, global poverty and sustainable development challenges, and • Recommends cross-cutting policies contributing to the knowledge society, financing and economic instruments, communication, mobilizing actors and multiplying success and implementation, monitoring and follow up. 	http://register.consilium.europa.eu/pdf/en/06/st10/st10117.en06.pdf
Report on Progress in the Implementation of the UNECE Strategy for Education for Sustainable Development (Canada, 2013)	<p>Illustrates for different regions how to implement the following UNECE priority action areas:</p> <ol style="list-style-type: none"> 1. to ensure that there is an education for sustainable development (ESD) school plan in every school by 2015, 2. to promote the introduction of ESD into teacher education, 3. to reorient TVET in support of sustainable development and the transition to a green economy. <p>Additionally, the report contains outstanding good practices and experiences with respect to ESD.</p>	http://www.unece.org/fileadmin/DAM/env/esd/8thMeetSC/Canada.pdf
<p>ESDN Quarterly Report 29 – July 2013</p> <p>National Sustainable Development Strategies in Europe 2013</p>	<ul style="list-style-type: none"> • Is based on up-to-date information from the European Sustainable Development Network (ESDN) Country Profiles (updates from May/June 2013), • Continues stock-taking of the National Sustainable Development Strategies (NSDS) that has begun with the ESDN Quarterly Report September 2010 • Includes and reflects on the work and debates at the ESDN Conference 2013 on the same topic. • Provides an analysis of the situation of NSDSs in Europe. • Investigates past achievements, explores new developments, identifies future challenges and takes into consideration the discussions and insights of delegates during the 2013 ESDN Conference. 	http://www.sd-network.eu/quarterly%20reports/report%20files/pdf/2013-July-National_Sustainable_Development_Strategies_in_Europe_2013.pdf

Strategy	Content	Further information
Green Skills Agreement Implementation Plan (Australia 2010)	<p>The 2010-2011 Green Skills Agreement Implementation Plan outlines initiatives across government, industry, public and private VET providers that will meet the objectives of the Green Skills Agreement.</p> <p>The Agreement has four primary objectives. These are to:</p> <ol style="list-style-type: none"> 1. develop national standards within the requirements of the regulatory framework in skills for sustainability instruction, 2. review and revise training packages to incorporate skills for sustainability, 3. upskill VET practitioners so they can offer quality instruction in skills for sustainability, and 4. implement strategies to reskill vulnerable workers in the transition to a low-carbon economy. 	http://www.sd-network.eu/quarterly%20reports/report%20files/pdf/2013-July-National_Sustainable_Development_Strategies_in_Europe_2013_executive-summary.pdf
Technical and Vocational Education and Training in Support of Strategic Sustainable Development (2011/Sweden)	<ul style="list-style-type: none"> • Looks at how TVET can be carried out to help society move towards sustainability. • Introduces the essential concepts of Strategic Sustainable Development (SSD), Education for Sustainable Development (ESD), TVET, and the barriers to integrating ESD into TVET. • Provides information about a case study conducted in a TVET organization in Ireland which is integrating ESD into TVET. • Presents the key aspects that TVET organizations need to have in order to successfully support SSD and provides a definition of success, which is <i>to develop a workforce skilled for sustainability</i>. Looks at the strengths and weaknesses, of the case study and three other TVET organizations. • Provides recommendations based on the challenges with integrating ESD into TVET 	http://www.bth.se/fou/cuppsats.nsf/all/48e6c957cabca9dbc12578aa004cf7d/\$file/BTH2011Gu.pdf

A participant introduced the "Citizen Commitment to Sustainability 2012-2022" of Barcelona as an example of a regional implementation strategy. The Citizen Commitment appoints different goals in the areas of biodiversity; public space and mobility; environmental quality and health; efficient, productive and zero emissions city; wise use of resources; good governance and social responsibility; people's welfare; progress and development; education and citizen action; and resilience and global responsibility (Barcelona City Council, 2012).

WebEx conference: the challenges of implementing and developing GTVET in Tanzania

A WebEx conference was held during the virtual conference to demonstrate the current status of GTVET in Tanzania. In preparing this conference, Dr. Sister Clara, Deputy Director of Academic Affairs at St. Augustine University of Tanzania in Bukoba, and Ocham Collins, Dean of the Faculty of Education at St. Augustine University, provided documents⁹ on the challenges of implementing and developing GTVET in Tanzania.

⁹ http://www.unevoc.unesco.org/e-forum/OchamCollins_ImplementingandDevelopingGTVET.pdf and <http://www.unevoc.unesco.org/e-forum/SisterClara-ChallengesforGTVETinTanzania.pdf>

Due to technical problems, the contribution from Tanzania could not be shared live. Therefore, the contribution is attached as an annex to this report. In summarizing the key points of the contribution, it can be stated that the TVET system in Tanzania is in a weak position, as stakeholders cooperate insufficiently and teachers are often not motivated. Therefore, there is a lack of basic skills, and projects that support and promote GTVET are rarely sponsored. The participants agreed that GTVET has to be improved, especially as TVET is regarded among experts as a successful opportunity to fight against unemployability and contribute to a more sustainable future.

According to the participants, GTVET is considered as one tool to overcome the challenges of societal changes, the impact of climate change and environmental degradation. Therefore, it will be necessary to bring together all relevant TVET stakeholders to modernize the TVET system,

integrate green skills and knowledge and improve the image of TVET.

Despite the technical problems, the WebEx conference led to fruitful results, with participants taking the opportunity to share their experience on GTVET. They formulated their needs in developing green skills and knowledge and discussed which obstacles they had met so far and what kind of help they need from different TVET stakeholders to develop GTVET.

Communication and support

To support the greening process and implement green qualifications into the TVET system in the long run, all relevant stakeholders have to contribute at their professional level. Moreover, a dialogue between the different levels is also necessary. For instance, at a national level frameworks should be developed to enable the modification



and adaptation of teaching and training programmes for the implementation of green qualifications at the institutional level.

During the WebEx conference, participants stressed the importance of communication and cooperation between stakeholders. They advocated for a close collaboration between TVET experts to collect evidence-based information that could further inform the global debate and policy initiatives, and foster dialogue between education and industry to identify the skills needed in the labour market.

A survey of stakeholders on "Understanding of the Concept and the Extent of Implementation of Greening Technical Vocational Education and Training" was conducted in the Technical High Schools in Jamaica in June 2013. Data was collected from policy makers (e.g. Ministry of Education), teaching staff (principals/teachers) and students. Simon Yalams, the UNEVOC Network Coordinator for the Caribbean Cluster, summarized the first results¹⁰. Irrespective of the target group, there was no common understanding of how to draft a concept for GTVET and how to implement green issues into schools as part of a holistic approach. To date, activities have been limited to measures of environmental protection such as planting trees and keeping natural grass areas, turning off powered machines or introducing a waste management system. However, some technical high schools in Jamaica were able to highlight their strategies to foster GTVET; for example, by designing and constructing a water catchment system, using energy-saving light bulbs in all facilities or designing and re-designing TVET laboratories with more windows to ensure natural cooling and lighting.

Overall, while there are already a number of promising practices in GTVET, much more has to be done. There is a need to develop a broad comprehensive concept for GTVET that will be supported by all relevant TVET stakeholders.

¹⁰ <http://www.unevoc.unesco.org/e-forum/GTVET-in-Jamaica.pdf>

Prof. Dr. Walter Tenfelde (Professor Emeritus of the University of Hamburg) introduced an "Empirical analysis of two destinations in the Ecuadorian Rainforest in the view of Sustainable Tourism" ¹¹. This analysis was conducted at the University of Ibarra (Ecuador) and shows how a teacher can work with students on greening issues. The analysis centered on the question: "Ecotourism – can it eradicate poverty of the local people?" The students participating in the Ecuadorian project on sustainable tourism gained a critical view on sustainable tourism in the rainforest. They learnt to reflect on their traditional strategies of pushing regional economies. They also discovered the hard conflict between "green" propaganda for sustainable tourism and the practical implementation of a "green" and economically viable implementation.

Another example, this time from Canada, was the Wind Energy TechnoCenter in Gaspé¹² (Quebec), which provides an opportunity for partners to work together on projects that meet their needs for research and infrastructure, combining the use of diesel and wind to generate energy. The project involves the development of a microarray that allows studying the behavior of a hybrid wind-diesel-solar-energy storage type. This project is intended for microarray research and technology validation, in addition to being a technological showcase.

The process of greening TVET has to be backed up by all relevant stakeholders at the institutional, national and global level. For this purpose, participants agreed that close dialogue and cooperation between all actors of the education and training system is necessary.

¹¹ <http://www.unevoc.unesco.org/e-forum/Tenfelde-SustainableTourismEcuador.pdf> and <http://www.unevoc.unesco.org/e-forum/PresentationTenfelde-SustainableTourismInRainforestEcuador.ppt>

¹² <https://www.eolien.qc.ca/en/infrastructures-en/microgrid-wind-diesel.html>



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Conclusions and recommendations

The virtual conference provided a unique platform to share knowledge and experience on GTVET. All participants confirmed the importance of GTVET. It became evident that Corporate Social Responsibility (CSR) and SD are an integrated part of improving the competitiveness of the enterprise, not only in large companies but also in the predominantly small- and medium-sized companies of the handicraft sector. In addition, the acquisition of green skills increases the potential of localities to support the expansion of green economies.

The participants also assumed that green skills will improve employability. Simultaneously, it became obvious that education is an important prerequisite for sustainable skills

and knowledge adaptation. Therefore, in some countries there is an initial need to develop an efficient TVET system that will be suitable to integrate green qualifications. In summary, many questions remain open and a greater exchange of information and further discussion are undoubtedly necessary. The analysis of all comments, questions and recommendations to continue the discussion on GTVET can be summarized as follows:

- There are various qualification models and strategies for the implementation of GTVET that are under preparation or already in use. It would be very interesting to know more about the theoretical approach of these qualification models and implementation strategies, such as their scientific background, intended knowledge and skills, pedagogical approaches, evaluation results and prospects of stakeholders, in order to identify the concepts behind them

and increase possibilities for replication or adaptation in other contexts.

- It would be recommendable to intensify the discussion on each topic tackled in the virtual conference by refining them further and setting up smaller discussion rounds with interested colleagues to explore the matter in more detail. A follow-up discussion should be structured in a way that it can provide more outcome-based results on GTVET issues. This way, more precise recommendations for relevant activities and measures (in relation to target groups) can be provided.
- The different examples presented during the virtual conference seem to be relevant for the participants. Therefore, it would be helpful to develop a concept for structured sample collection to which further examples can be continuously added. The concept should describe clearly quality criteria for good green (practice) examples.
- A number of surveys describing the need for green skills for green jobs (e.g. Cedefop, 2009; Strietska-Ilina et al., 2011) already exist. Furthermore, there are also quite a few examples demonstrating how to integrate sustainable aspects and green skills into curricula and training programmes, with some institutions engaging in a holistic approach (green campus, green curriculum, green research, green community, green culture). In addition, many projects have been carried out that deal with the inclusion of green skills and knowledge in curricula and training programmes at different levels of education and training in a variety of occupational sectors, in both developed and developing countries. This calls for a survey to collect, cluster and categorize these activities and measures.
- There are many good projects and examples. However, the question remains how to establish a solid structure for systematically integrating GTVET aspects into the TVET system. A comparative analysis illustrating how various countries organize the implementation of GTVET,

including the obstacles and success factors of this process, can support a systematic approach to integrate green skills and knowledge into the TVET system.



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Participation

Overview

Number of participants: 183

Number of countries from which participants came: 65

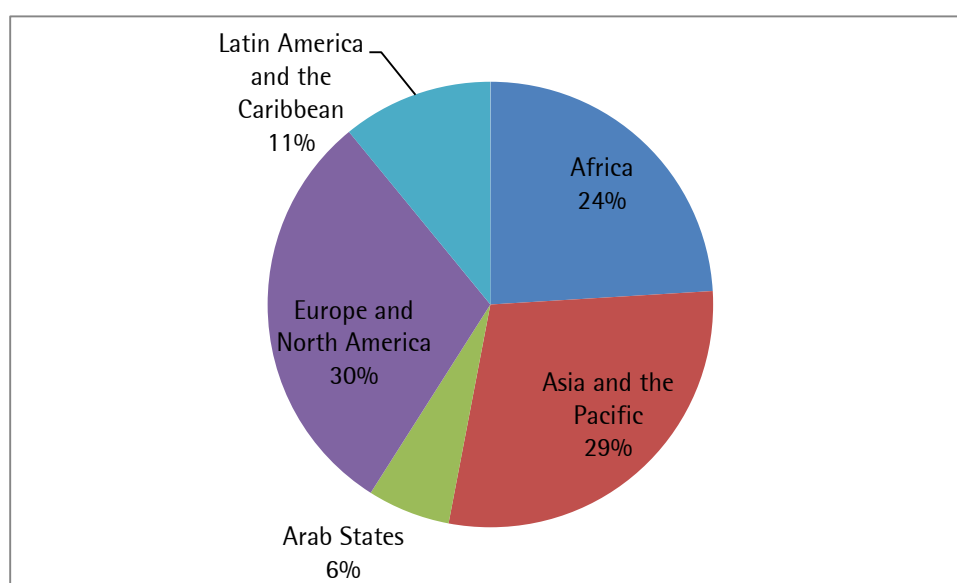
Network Members: 66 (36%)

Male: 104

Female: 79

Number of messages exchanged: 47

Regional distribution of participants



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About the moderator



Julia Kastrup holds a doctoral degree in vocational and business education and a diploma in nutrition and home economics. She is an expert in education for sustainable development and she has worked in various research projects covering these issues – among those a project on environmental education and staff-qualifications. Most recently she worked as a Research Associate in context of the scientific monitoring of model-projects under the funding priority "Vocational Education and Training for Sustainable Development" at the University of Hamburg (Germany). Dr. Kastrup moderated in collaboration with Dagmar Winzier, who works as programme expert at UNESCO-UNEVOC mainly in the field of Greening TVET and education for sustainable development.

Annex: The challenges of implementing and developing GTVET in Tanzania

A WebEx conference was held during the virtual conference to demonstrate the current status of GTVET in Tanzania. In preparing this conference, Dr. Sister Clara, Deputy Director of Academic Affairs at St. Augustine University of Tanzania in Bukoba, and Ocham Collins, Dean of the Faculty of Education at St. Augustine University, provided the following presentation on the challenges of implementing and developing GTVET in Tanzania.

The crucial challenges:

- Inadequate GTVET base and skills;
- Lack of GTVET teaching and learning materials;
- Inadequate holistic, relevant and culturally-suitable GTVET for local conditions;
- Examination pressure among the TVET learners;
- Inadequate funds for various GTVET projects;
- Inadequate research and documentation on GTVET;
- Lack of clear linkages among cross-cutting issues;
- Low morale among TVET teachers due to various reasons;
- Weak coordination and networking of TVET providers in the country;
- environmental issues including TVET are a low priority in the country; and
- Inadequacy of financial, human and material resources in teaching and training institutions.

The most urgent needs for action:

- At the planning stage, there is a need to involve all major stakeholders (including the local communities, religious organizations, NGOs etc.) in the process of developing vocational education and training curricula. Only this will ensure that training people with relevant knowledge and skills required in the emerging fields is in line with the initiative to conserve the environment and ensure sustainable development.
- Mainstream environmental issues in the vocational education and training curriculum in line with the local realities.
- The private sector, which is the major employer of people with vocational skills, should be encouraged to work hand in hand with the government. For example, the government shoulders the cost for the construction of a biogas digester in Kenya. This will provide the youth with biogas construction and maintenance skills to form groups; in turn, this can encourage people in rural areas to construct biogas digesters, which can be friendly to the environment since it prevents using firewood and charcoal, the major source of lighting and cooking energy in the rural areas.
- The government can encourage the private sector's involvement in vocational and technical training to incorporate its environmental policies in their curriculum.
- Experts and stakeholders from government and non-governmental organizations (NGOs) are highly needed for the implementation of GTVET. In the Tanzanian context, this includes:
 - Ministry of Education and Vocational Training (MoEVT);
 - National Environment Management Council (NEMC);
 - Tanzania Institute of Education (TIE);
 - Environmental Technology Association (ENVITECH); and
 - various community-based organizations (CBOs).

These stakeholders are likely to steer GTVET through formal and non-formal systems because they are capable of enhancing the acquisition of knowledge and skills at various levels through teaching and learning or training. These stakeholders are also able to increase the awareness and sensitization to change the behaviour towards improved environmental management and sustainability. Specifically, they will be able to:

- Strengthen the institutional framework for implementing GTVET;
- Improve the capacity building of actors in GTVET;
- Strengthen capacities for the study and evaluation of GTVET by involving the TVET Unit at the ministries of education, inspectorate, regional and district education offices; and
- Mainstream GTVET in educational planning and budgeting processes.

How the different TVET actors can support the implementation process:

Teachers' and trainers' capacity building

- Organize practical training for teachers and trainers and acquaint them with environmental issues and the various policies and legal frameworks of the government;
- Expose them to what others are doing in other countries regarding vocational training and environmental conservation; and
- Encourage them to develop local initiatives for environmental conservation.

Politicians

- Develop and pass policies and legislations that will encourage the implementation of environmental policies put in place by the government;
- Publicize vocational education and training to attract more young people. In East Africa, there is a strong emphasis on university education at the expense of

vocational training. In Kenya, for example, technical colleges and polytechnics are moving towards being universities. This leaves a very large gap in the emerging areas that require occupational skills; and

- Upgrade and strengthen vocational training institutions through ensuring better funding and the availability of environmentally friendly facilities and equipment that can be used for training in the emerging areas of vocational training.

In addition, the following was suggested for a smooth implementation of GTVET:

1. Conduct needs assessments to identify various issues related to GTVET;
2. Develop strategies to implement GTVET standards;
3. Identify groups of trainers and involve GTVET practitioners in the training of trainers (ToT);
4. Streamline issues related to GTVET in all curricula for teacher trainees at college and university levels;
5. Facilitate studying opportunities and continuing training for educational practitioners;
6. Enhance collaboration and networking among GTVET practitioners within and outside the education system;
7. Identify GTVET experts capable of developing relevant GTVET learning and training support materials;
8. Organize forums for stakeholders, making them aware of GTVET;
9. Organize workshops promoting GTVET for sustainable development in Tanzania;
10. Design mechanisms for monitoring and evaluation and enhance the monitoring and evaluation of GTVET practices in general;

11. Organize forums for discussing monitoring and evaluation reports; and
12. Strengthen the existing Teachers' Resources Centres (TRCs) to accommodate GTVET activities and establish a GTVET Centre for Excellence.

These statements and ideas of Dr. Sister Clara and Ocham Collins reflect a representative situation of GVET in many countries in Africa. Some experts and participants also confirmed these findings.

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