



United Nations
Educational, Scientific and
Cultural Organization



International Centre
for Technical and Vocational
Education and Training

Greening TVET for Sustainable Development

Report of the UNESCO-UNEVOC
online conference

22 October to 2 November 2012

Moderated by Kai Gleissner



Published by
UNESCO-UNEVOC International Centre for
Technical and Vocational Education and Training
UN Campus
Hermann-Ehlers-Str. 10
53113 Bonn
Germany
Tel: [+49] 228 815 0100
Fax: [+49] 228 815 0199
www.unevoc.unesco.org
unevoc@unesco.org

Photo used in Cover Design © Flickr/Agrilife today

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of UNESCO concerning the legal status of any country, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The author is responsible for the choice and the presentation of the facts contained in this publication and for the opinions expressed therein, which are not necessarily those of UNESCO and do not commit the Organization.

ISBN 978-92-95071-48-3
© UNESCO 2013
All rights reserved

Table of contents

Table of contents	3
Foreword	5
Introduction	7
1. Summary of discussions	9
a) Sustainable development and green development	9
b) Green jobs and green skills	10
c) Greening TVET	13
d) Recent developments and examples of greening TVET	15
2. Lessons learned	19
3. Outlook and recommendations	20
Additional resources	22
Participation	23
About the moderator	28

Foreword

As part of its mission to support the global development of technical and vocational education and training (TVET) and foster interaction and learning among TVET stakeholders from all over the world, the UNESCO-UNEVOC International Centre hosts the UNEVOC e-Forum, a virtual community of TVET experts from around the world who share information and knowledge about different aspects of TVET. To further promote focused debates on crucial themes in TVET, the UNESCO-UNEVOC International Centre introduced moderator-driven e-Forum discussions. Through these discussions, UNESCO-UNEVOC aims to enhance awareness and encourage wider debate and understanding, including sharing promising practices and the formulation of new ideas in the field of strategy and policy development. The discussions, guided by an expert in the field, seek experiences, expertise and feedback, with the aim of inspiring people to take further action.

UNESCO-UNEVOC recognizes the important role that TVET plays in integrating concepts of sustainable development, and has committed its work to supporting Member States in developing sustainable TVET strategies. Greening TVET is an essential and cross-cutting theme for sustainable development. The Shanghai Consensus, the outcome document that followed the Third International Congress on TVET, held from 13 to 16 May 2012 in Shanghai, China, states that education for green economies and green societies should be included as a part of TVET qualifications and programmes, and the greening TVET agenda should advance

towards slow-carbon and climate-resilient growth and development. It is also in this context that UNESCO-UNEVOC organized an international forum with the theme 'the role of the UNEVOC Network in transforming TVET for a sustainable future', where participants acknowledged that greening skills are critical for sustainable development.

From 22 October to 2 November 2012, a moderator-driven discussion was held on the topic of greening TVET for sustainable development. The conference brought together almost 150 participants from more than sixty countries. Various issues in greening TVET for sustainable development were discussed during the twelve-day conference. The discussion identified the relationship between sustainable development and green development, and clarified different definitions of green jobs and green skills. Participants also shared different examples of greening TVET, and highlighted that greening TVET does not only consist of developing green jobs and greening TVET concepts, but that it should also incorporate societal and cultural aspects.

The guest moderator for this online conference on greening TVET for sustainable development was Mr Kai Gleissner from Otto von Guericke University, Magdeburg, Germany, a UNEVOC Centre. We thank him sincerely for providing his expert knowledge and full engagement to this conference. Our gratitude also goes to all e-Forum participants who shared their professional and personal practices on the topic of greening TVET for sustainable development.

Shyamal Majumdar
Head of UNESCO-UNEVOC International Centre

Introduction

Green economy, green technologies, green TVET, green jobs – green ideas seem to have an important effect on a variety of political, social and ecological processes. In recent years sustainable development has been discussed as a concept for a future development in many different ways, and increasingly people recognize that we need to ensure that future generations are left no worse off than the current generation.

Furthermore in the context of the changing nature of industry and work, the pressures of a global financial crisis, and the limits and opportunities posed by climate change and other environmental imperatives, major impacts can be recognized upon business, industry and society as a whole. It is now clear that we need to integrate the idea of sustainable development into working processes and educational concepts.

Many new industries and employment opportunities are being developed, for example in ecotourism, environmental monitoring, sustainable community development, eco-design, recycling, alternative energy sources, land rehabilitation, pollution control, and waste water treatment and reuse. All these trades require skilled workers who have knowledge of sustainable development as well as technical knowledge and knowledge about new working processes. This needs to find recognition in TVET programmes.

In the field of vocational education it means that TVET for sustainable development has to contribute to developing, strengthening and disseminating ways of sustainable thinking and acting.³ Workers should be able to use their knowledge and their qualifications to identify the social, economic and ecological challenges facing modern societies and to develop ideas and strategies for suitable

3 See e.g. Diepenbrock, Freya. 2005. Die UN-Dekade, 'Bildung für nachhaltige Entwicklung' (2005-2014) als Beispiel für den Aufbau stabiler Netzwerke. BIBB, Nachhaltigkeit in Berufsbildung und Arbeit, Bonn, S.96.

solutions. Thus, it is important that TVET does not only impart technical and specialized knowledge but also develops conceptual and systemic thinking and acting.⁴

In addition TVET stakeholders need to assess which new fields of work the new technologies and the new green economy deliver, and on this basis they need to develop new 'green job concepts' which include the idea of sustainable development. They must also incorporate these new occupations and concepts into TVET processes.

This significant and necessary process of greening TVET was the topic of this e-Forum conference. The objectives of the online conference were to:

- review current trends and international discourse for greening TVET and sustainable development;
- comprehend country perspectives on best practices in reorientation towards greening TVET in support of education for sustainable development (ESD);
- discuss different ways of assessing fields of green work;
- review and discuss concepts for the integration of greening TVET into the education curriculum;
- assimilate innovative and applied education concepts for TVET;
- discuss the role of TVET teachers in the fields of work involved in greening TVET;
- formulate directives and strategies for building capacity in reorienting TVET towards greening in pursuit of ESD.

4 See e.g. de Haan, Gerhard. 2003. 'Erwerb von Gestaltungskompetenz als Ziel von Bildung für nachhaltige Entwicklung!' Bundesministerium für Bildung und Forschung (BMBF), Berufsbildung für eine nachhaltige Entwicklung, Bonn, Ss.46-49; Hahne, Klaus. 2008. 'Konturen einer Didaktik für nachhaltige Entwicklung in der Berufsbildung!' Adolph, Gottfried, Jenewein, Klaus, Pahl, Jörg Peter et al., Lernen & Lehren – Schwerpunktthema Berufsbildung für nachhaltige Entwicklung, Heft 90, 23.Jahrgang, Wolfenbüttel, S.62.

Extracts from the discussion of each topic form the basis of this report. The depth of discussion differed between topics, reflecting variations in the time allocated and the number of participants engaged.

The online conference was focused on the following central questions:

- What is meant by sustainable development and greening TVET?
- In what fields are green jobs to be found? How can we assess these fields of work? What are green occupations?
- How can we 'green' TVET? How can the greening TVET concept be integrated into the education curriculum, and what are the fields of work involved in greening TVET?
- What is the role of teachers in integrating the greening TVET concept into their teaching and the curriculum?

Because of the limited time available for the conference, not all these questions could be discussed exhaustively, but the discussions gave a first introduction to these important fields.

The discussion was guided by the following themes:

- The equal access of women to TVET, and the relevance of different actors, institutions, sectors, policies and evaluation.
- The impact of traditions and cultural orientations on the participation of women and on other stakeholders in TVET.
- The significance of the division of labour markets on women and TVET.

1. Summary of discussions



a) Sustainable development and green development

© Flickr/Agrilife today

Does green development mean the same as sustainable development? This was one of the first questions we explored in the online conference. The discussion was focused on the meaning of green development. Sustainable development refers to three types of development: social, environmental and economic.

It was considered that green development has a main focus on environmental issues: for instance on climate change, the green economy, renewable energy, green technologies, and TVET for jobs in these fields. Participants also mentioned other aspects

including social effects and questions of economic responsibility. It was pointed out that the environmental challenges facing us today are not just connected to social and economic challenges, but that they make up the interwoven threads of the challenge of moving to a sustainable and humane society.

The question of consumerism also needs to be discussed in this context, including the issue of limited resources. The finiteness of the earth's resources and the increasing demands on them will lead to conflicts which will raise important social questions (for example about human well-being, community life and inequality).

That means that discussion of the concept of green development, when this is conceived as involving not only just economic growth but a broader pattern of social and economic development, also needs to consider the social and economic aspects.

Such concepts do not only focus on the responsibility of states, institutions and companies. These concepts focus on individuals. This also means that everyone needs to change their attitude in order to conceive of green development as a challenge and a chance to develop a sustainable future.

This future world will need to address not just green technology but stronger communities, opportunities for rewarding work, support for families, and opportunities for physical exercise and mental stimulation.

b) Green jobs and green skills

Definition of green jobs

The participants considered many different definitions of the term 'green job'. Among them was the definition given by Alex Bowen³, that green jobs are jobs that are associated with environmental policies and goals. The European Union described green jobs as 'the key to a sustainable economy'.⁴ A more detailed definition was developed by the United Nations Environment Programme (UNEP), in which green jobs are:

"work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute(s) substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs

3 Bowen, A. 2012. 'Green' growth, 'green' jobs and labour markets. www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2012/03/07/000158349_20120307084323/Rendered/PDF/WPS5990.pdf (Accessed 11 November 2012.)

4 EU. 2012. Green Jobs: The key to a sustainable economy. www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+IM-PRESS+20100712IPR78671+0+DOC+XML+V0//EN (Accessed 11 November 2012.)



© ILO/M. Crozet

*that help to protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high efficiency strategies; de-carbonize the economy; and minimize or altogether avoid generation of all forms of waste and pollution."*⁵

A final definition comes from the International Labour Organization (ILO). It defines green jobs in the following way:

Green jobs are decent jobs that:

- Reduce consumption of energy and raw materials
- Limit greenhouse gas emissions

5 UNEP. 2008. Green Jobs Report. www.unep.org/labour_environment/PDFs/Greenjobs/UNEP-Green-Jobs-Report.pdf (Accessed 11 November 2012.)

- Minimize waste and pollution
- Protect and restore ecosystems.⁶

Whatever the precise definition used, the focus of green jobs is on minimizing and being accountable for environmental impacts. These jobs call for environmentally (eco-)friendly practices and policies.

Definition of the green economy

The participants also discussed the term 'green economy', and several definitions were offered. A first definition comes from the Organisation for Economic Co-operation and Development (OECD):

Activities which produce goods and services to measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. This includes technologies, products and services that reduce environmental risk and minimize pollution and resources.⁷

Another detailed description is found in the Green Jobs Act (2007) of the United States of America (USA):

- energy efficiency and renewable energy industries ... include:
- the energy-efficient building, construction, and retrofits industries;
- the renewable electric power industry;
- the energy efficient and advanced drive train vehicle industry;
- the biofuels industry;
- the deconstruction and materials use industries;

- the energy efficiency assessment industry serving the residential, commercial, or industrial sectors;
- and manufacturers that produce sustainable products using environmentally sustainable processes and materials.

Defining green jobs

In the discussion, it was realized that it is necessary to assess the fields of work and profiles of so-called green jobs in different countries. The participants considered how best to achieve this. They felt it required an analysis country by country, including the characteristics of the sector, national requirements (also relevant in the field of TVET) and trends (for example factories of the future and energy-efficient green cars). The analysis needs to include all important players in the definition process: partners at different institutional levels (state, region, municipality and so on), social partners, chambers of commerce and other institutions involved in TVET management and in the different phases of the certification and validation process.

There are a number of training needs assessment methods that help to define fields of work. On this basis it is possible to define job profiles which include descriptions of competencies, skills and work tasks. These profiles and competency descriptions are needed as a basis for training curricula and programmes.

Green competencies

In order to define green jobs the question of competencies was also discussed, and especially the extent that competencies can be green. The discussion at this point focused on a basic understanding of the competencies needed for green development.

It was considered that the term 'competency' should be understood in a broad sense, as

⁶ ILO. 2012. Green jobs. www.ilo.org/global/topics/green-jobs/lang--en/index.htm (Accessed 11 November 2012.)

⁷ OECD. 1999. Opening Markets for Environmental Goods and Services. www.oecd.org/trade/environmentandtrade/35415839.pdf (Accessed 11 November 2012.)



a set of interdependent abilities, related to 'learning to do', and an essential component of the process of 'learning to know' (this relates to the model that involves learning to know, learning to do, learning to live together and learning to be).⁸

The German concepts of Systemkompetenz (which can be translated as system competence) and Gestaltungskompetenz (less easily translated into English, but a rough equivalent is operational competence) were introduced. Operational competence stands for the balanced development of skills and competencies in young people especially in professional, social and even individual areas. The development of operational competence aims at enabling young people to develop their capabilities in a comprehensive way which will allow them to deal actively and responsibly with future tasks in both their working life and their social and private life.

⁸ UNESCO. 1996. Learning: the treasure within. <http://unesdoc.unesco.org/images/0010/001095/109590eo.pdf> (Accessed 11 November 2012.)

Understanding the concept of system competence involves understanding not only the technical terms, but also that the TVET system and the work system (with their conditions) are just two out of a plurality of systems. There are also other systems (for example ecological, economic and social systems) which have impacts on TVET and the system of work, and equally TVET and work systems have impacts on these other systems.

System competence involves the ability to understand the processes and tasks of sustainable development, be aware of sustainable actions, feel responsible and act in this matter. It also involves including this way of thinking, these ideas and this knowledge (which also includes professional knowledge) in the working process and in the person's personal life. To achieve these competencies teachers have to allow students to develop independence and a degree of responsibility.

The participants also mentioned the field of social responsibility. Social responsibility is



© UN-Photo/K.Park

something all organizations need to consider. It is also important for people to acquire the knowledge and skills that will enable them to participate in social change, while promoting development of the complete person.

An important role of TVET and TVET institutions is to provide individuals with the knowledge, skills and competencies that will enable them to participate in social change, and state that the social and economic trends predicate the need for a new development pattern in which a culture of economically, environmentally and socially sustainable development is a central feature.

c) Greening TVET

An important basis of the discussion was the definition of areas by Shyamal Majumdar. He developed a model for greening TVET with five central working areas: a green campus for training in and living through green concepts; a green technology programme to provide

the skills needed for clean and green jobs; a green community, in which green ideas can be discussed and be realized in practice; green research, which collects new data and develops new concepts; and a green culture, which is at the heart of a green society.⁹

The participants developed two definitions of their own for greening TVET areas, which bases on existing ones but also helps to show which working areas are important for the future work in Greening TVET. The first definition concentrates more on general conclusions, namely:

“Creating awareness about the need to deal carefully with the environment, and about the fact that every individual has some responsibility in this respect. This refers to the educational component of TVET.

⁹ Majumdar, Shyamal. 2010. Greening TVET: Connecting the dots in TVET for sustainable development. <http://iveta2010.cpsctech.org/downloads/materials/full%20papers/1.%20Greening%20TVET.pdf> (Accessed 11 November 2012.)

Including green competencies in existing occupational/job profiles, which focus on reducing the environmental impact of production, services and how people work, while (it is hoped) enhancing productivity and the quality of products and services. (Background literature on the building sector was a source for this.)

Looking at the need for new qualifications, competencies and occupational profiles for emerging businesses, which deal with reducing the environmental impact of human activities.

Looking at self-employment opportunities that are generated by the shift of policies and public awareness. This includes opportunities for new TVET graduates, but TVET can also contribute to enabling older people to develop the competencies to establish green-oriented businesses."

The second definition sets out some concrete working steps, with a focus on professional training. These steps include:

- Evaluation of the needs for a green economy;
- Evaluation of green jobs and their working tasks (developing job descriptions and descriptions of competencies needed);
- Development of curricula for education and training for green jobs;
- The training of teachers and trainers in this field;
- Development of learning/teaching materials;
- Development of infrastructures for training and education;
- Development of cooperation networks between companies, schools, state institutions and vocational research institutions.

The development of training curricula was discussed as one important working field. In

order to 'green' TVET it will be necessary to initiate developments in existing jobs and concepts. Greening TVET also calls for us to develop new green TVET curricula. These new curricula should include existing subjects and practical training in job skills, as well as including new skills, tasks and competencies.

Greening TVET basically involves including new 'green knowledge' to provide a basis and new 'green methods' for developing new competencies in TVET. Participants considered that on the one hand, greening TVET is an issue that crosses all sectors, occupations, qualifications and training. On the other hand, greening is more important in some sectors than others. These include renewable energy and energy efficiency at the household and industrial level (energy supply, electricity generation), recycling, agriculture, forestry, building and construction, transportation, and basic industry (including iron, steel, aluminium, cement, pulp and paper production).

Greening vocational curricula and training methods also has consequences for TVET teacher training. New education programmes need to be designed or old ones need to be adapted, to focus on learning to learn, on developing emotional, social and spiritual intelligence, and on strengthening competencies to understand and exercise collective learning.

Greening TVET will not be an easy process. Greening strategies need to consider the conflicts that may arise because green innovations will disrupt existing work processes and economic interests. Vocational education planners, teachers and trainers need to be aware of these possible difficulties. Existing structures could also pose a problem because they are not ready for new developments. Existing deficiencies in TVET systems can be a problem: for example TVET systems and programmes that do not match work and job systems, outdated materials and methods, a lack of awareness of new innovations regarding green TVET issues, missing links or lack of communication between green TVET

experts and technical subject experts, and a shortage of experts in the field of green TVET.

Furthermore participants considered that putting the concept of green TVET into practice would be a long process, so vocational education planners, teachers and trainers may need some perseverance to implement it. 'Greening TVET' indicates hope, growth and prosperity for the future world. At the moment, however, greening TVET must be seen as a basic idea for an essential process, and should be widely known.

d) Recent developments and examples of greening TVET

The online conference provided an interesting insight into several existing projects, concepts and examples in the field of greening TVET. They are described in the following section.

India: Toyota Technical Training Institute and the Cane and Bamboo Technology Centre, Guwahati (introduced by T. Somanath and A. Sharma)

The Toyota Technical Training Institute in Bangalore, India trains (financially) poor students from rural areas in automobile engineering by giving a holistic training in addition to imparting necessary knowledge and skills in relevant technical areas of car manufacturing. Environmental topics and issues are included in the curriculum. The three-year training programme is offered to secondary school leavers (the average age of the students is 16 years). The training, including board and lodging, is offered free of cost for the entire three years. The Toyota Technical Training Institute



© Flickr/Sustainable Sanitation

chooses several methods to support the development of an environmental awareness in the students in its programme:

- Teaching and awareness rising: the students learn about the consequences of wasting food in the canteen (target: zero wastage), about the concept of good housekeeping, how to segregate waste in their dormitory, workshop and training centre, and how to identify and reduce waste.
- Building a fellowship system: students can be designated fellows if they learn and demonstrate all the above-mentioned activities. Those appointed fellows and those who demonstrate the right attitude receive extra payment.
- Long-term teaching: because the course lasts three years and they receive continuous feedback from the trainers, students are able to consider these topics and issues in depth, and can become model workers. The project concept is to integrate green actions into students' long-term behaviour pattern, so that these actions become habits and the students retain green attitudes.

Another project in India is based at the Cane and Bamboo Technology Centre (CBTC) in Guwahati. The CBTC was established at Guwahati with support from a United Nations International Development Organization (UNIDO) project. This government-supported institution is intended to identify and promote technologies to enhance new economic and social development in the north-east of India. For this reason it is also responsible for providing training and access to improved technologies. One project focuses on support to the informal sector. It aims to develop curricula on bamboo-based skills (using bamboo for handicrafts, furniture and construction), and impart these skills to young people. The curricula also focus on green inputs, so students learn to use bamboo instead of wood, as well as about the cultivation and harvesting of bamboo.

Costa Rica: Agro-Pecuario (introduced by A. Mendes)

A. Mendes shared her experiences of two technical and vocational high schools in La Cuesta, Costa Rica. These are known as Agro-Pecuario, and normally offer training in agriculture including cattle rearing.

She showed how two different schools in the same area have taken different paths over recent years. One school with 700 students now enrolls only 15 students each year to study farming, while it trains over 600 students a year in the skills needed for jobs in call centres. These jobs are relatively well paid, but they have the disadvantages that workers often have to move away from their home town, and the jobs do not offer much opportunity for personal or professional development.

The other tech-vocational school has a similar number of students, but most of them enrol in the 'agro-pecuario' programme. These students become skilled workers in the field of modern agriculture. They tend to continue to live locally once their courses end, and some of them pursue further education options, such as university degrees in agricultural engineering.

This example shows how different schools react to economic developments in the country and organize their curricula. The question that arises in the conference context is how such schools can include in their educational planning and management key sustainable development ideas such as long-term planning, social responsibility (that is, taking into account the needs, interests and expectations of different players, not just companies but also workers and families) and topophilia (the love of a place, a sense of community and geographic identity). The first school is focused on short-term, industry-related needs, but does it take into account local needs, resources and the community or individuals who belong to it?

Canada: a new sustainable energy programme in TVET (introduced by C. Buckler)

C. Buckler from Canada introduced us to a programme in Manitoba, Canada. The state of Manitoba's green plan, Tomorrow Now, was released in June 2012:

*This eight-year strategic plan is designed to ensure a prosperous, environmentally conscious economy for the future of Manitoba. The plan recognizes the need to instil 'green skills, knowledge and values within our existing and future workforce.'*¹⁰

The programme includes a new Sustainable Energy Program which will introduce students in the region to the skills needed to work in green jobs, as well as other programmes and projects in the field of TVET. To enhance the work of greening TVET, the International Institute for Sustainable Development (in Winnipeg, Manitoba) in partnership with Manitoba Education carried out a study into the current situation in TVET in Manitoba, focusing on whether providers were including sustainable development concepts in their training programmes and their organizational and teaching structures and processes. The report was released in October 2012. It described existing practices and barriers, and made a number of suggestions for strengthening ESD in TVET in Manitoba.

Nigeria: a training workshop on the application of solar photovoltaic technology (introduced by M. Abubakar)

In 2010 the National Board for Technical Education (NBTE) Centre of Excellence for TVET (a UNEVOC centre) in Nigeria organized a training workshop on the application of solar photovoltaic technology. The workshop was

¹⁰ Taylor, Susan and Creech, Heather. 2012. Technical-Vocational Education for Sustainable Development in Manitoba. www.iisd.org/pdf/2012/technical_vocational_education_sd_mb.pdf (Accessed 11 November 2012.)

part of an attempt to engage schools with programmes that will produce specialists and technicians to spur the development of these viable sources of clean and cheap energy. The workshop involved 70 lecturers from polytechnic schools. This training programme was simultaneously a sensitization on solar photovoltaic technology, and a practical exposure to the basic techniques of design and installation. An additional goal was to make the lecturers aware of this topic so that they would include it in their TVET curricula.

The workshop started with the fundamentals, including safety and health matters and fundamentals of solar photovoltaic cells, modules and arrays, as well as characteristics of batteries. In the second part of the programme, participants were taught basic aspects of technical practice for design and implementation, such as fuel generators and their shortcomings, passive solar designs, system sizing for off-grid and on-grid systems, system installation, testing and commissioning.

M. Abubakar pointed out that the workshop generated a lot of excitement among participants. Almost everyone wanted to acquire skills in solar photovoltaic installation, which were considered to be vital.

Before they departed from the workshop venue, the participants established an association, the Renewable Energy Application and Technology Society (REATS), which is now registered with the Corporate Affairs Commission. The society aimed to popularize renewable energy application in Nigeria, and work with NBTE to develop curricula for the national diploma programme.

Mr Abubakar added that unfortunately the society is not yet in a position to achieve these objectives because it is still working to put together a satisfactory proposal which will obtain funding. At the moment the NBTE is discussing how to rekindle the initiative, and especially how to develop a course leading to a diploma in solar photovoltaic technology.

*Germany: including green TVET in the education of TVET teachers and experts
(introduced by K. Gleißner)*

At the Otto von Guericke University in Magdeburg, Germany, aspects and topics of sustainable development have been introduced into the TVET Teacher and TVET Experts education programmes. A Vocational Education for Sustainable Development module was developed, which includes several seminars in this field. In these seminars the students are sensitized to sustainable development. They learn about the green economy, green jobs, green TVET, and how to develop green concepts and curricula.

At the beginning of the course the teachers use material from a variety of contemporary media sources (movies, reports, newspapers and so on) to introduce students to the importance of this topic. The students need to understand that sustainability is part of their own life, and that they need to think about their personal life and their behaviour. The 'green footprint test'¹¹ can be helpful as a basis for a discussion.

In the second part of the module students become familiar with technical topics, with questions regarding to the challenge to meet economic needs and ecological and sustainable issues, with the questions of green skills and competencies that are needed, and the question of curriculum development considering sustainable development. In addition to these theoretical seminars the university developed a study visit programme in which the students visit several institutions that also work in the area of sustainable development. Students visit companies in the field of waste recycling and renewable energy, or TVET schools already working with these topics. It is essential

¹¹ A green footprint test is a test which includes question about the individual's behaviour regarding energy use, personal waste management, use of public or private transport and so on. The main goal of the test is not to see which individual scores the most points, but to introduce these topics and to initiate discussions and prompt thought about these topics.

to the programme that students have the opportunity to get practically involved and engage in discussions with experts in the field.

Additionally, the university organizes project seminars in which students working in groups develop, organize and evaluate project ideas and projects with a focus on sustainable development. They are requested to work on such topics for almost six months, so by the end of this period they are very familiar with the issues of greening TVET.

2. Lessons learned

© ILO/Truong Van



The online conference tried to initiate a discussion about a very complex topic. As the summary of the discussions above illustrates, understandings of what is meant by green, green TVET and green development can vary greatly. Discussion about sustainable development also seems to play a big role in this field. It is a challenge to find a common understanding which we can use as a basis for the concept of greening TVET. We believe it would be a mistake to focus entirely on environmental issues and not include social and economic issues, since these wider problems will inevitably confront students in their later life.

As UNESCO pointed out,¹² TVET seems to be one of the best ways of initiating the process of greening the future. TVET has a direct impact on work processes, on industries and companies, and on individuals.

However, those implementing new TVET concepts need to consider the daily reality of people's lives. It is unlikely that a single concept will prove suitable in every context: the concept chosen must reflect the regional situation and regional needs.

Greening TVET does not just mean developing green jobs and developing greening TVET concepts. Greening TVET has

12 UNESCO. 1996. Learning: the treasure within. <http://unesdoc.unesco.org/images/0010/001095/109590eo.pdf> (Accessed 11 November 2012.)

to be a much wider concept. It does not only need to consider the development of green jobs, green training concepts and modern training institutions; education experts also need to consider the requirements for a learning society, a research community and a green culture.

Green jobs can be defined through different analysis steps (such as training needs analysis, TNA). Green job profiles with a focus on industrial needs as well as scientific, political and social inputs need to be defined over the next few years. For that reason it is necessary to develop the idea of green competencies. These will be the basis on which we can build new curricula and new teaching methods.

TVET institutions and education planners face several challenges, and it will be a long process to put greening into practice. The greening TVET process should not be seen as a new problem, it should be seen as a real chance to develop a better future.

People should however also talk about integrating green ideas into their lifestyle. It is not easy to teach this concept, or to find ways of introducing green practices into people's lives. There is no one solution that works in every context. Incentives are one option: for example, the Finnish and German governments introduced a refund system to encourage people to recycle their waste. But people also need to develop a sense of personal responsibility. They need good information

about the problems to provide a basis for them to rethink their behaviour and their attitudes.

3. Outlook and recommendations

It is nearly impossible to provide an outlook for the process of greening TVET. At the moment we still stand at the beginning of this development. The concept of sustainable development has been a subject of discussion since 1992. Twenty years later people are beginning to understand how important it is to consider aspects of green and sustainable development.

Economic issues seem to be most important, especially in the current climate of global economic crisis, and work is a central aspect of our lives. This is why TVET plays such an important role, because TVET provides people with a basis for their working lives. TVET will never function like an adjustable screw, so people can access and use it when and how they need to, and obtain full solutions for all the challenges that sustainable development faces. But maybe TVET can offer some ways to combine the changing needs of the economy, environmental and social issues, and the daily reality of each individual, so that sustainability fits into people's lives and is accepted by them. Work should never be the only aspect of someone's life, but work is an important part of life, so TVET needs to cover the concepts relevant to people's lives as a whole, not just their work.

Green ideas are still under social and political discussion. Although in Europe these discussions have been taking place for over thirty years, the importance of this topic is still not fully accepted, and often other issues are prioritized over sustainability and greening society. Schools have a lot of information about these issues, and they are frequently reported in the media, but daily practice lags behind. We still use cars for even short journeys, we produce a lot of waste, a lot of countries are planning new power plants

using fossil fuel or atomic energy rather than renewables, and these are just a few examples.

There are also large differences in viewpoint over how green policies should be implemented. Some theoretical and political concepts perceive individuals as central, and believe the essential thing is to persuade them of how important these issues are and how they should act on them. Others call for a strong role for the state, and the introduction of laws to enforce a change in behaviour. It is doubtful that this second course of action can succeed alone, if people are not willing to accept the new ideas freely and to develop these new attitudes by themselves. To give them a chance to develop these attitudes, there needs to be a good information base so they can acquire knowledge about what they might do. This brings us back to where we began, with TVET training.

TVET training does not just give information. It can also include ideas on how to take steps towards green working practices, and how to incorporate these into daily working life. For this reason education planners need to consider green development as an important aspect in future TVET. TVET can be the door to encouraging people to make changes in their lifestyle as well as their work. It will be a long journey, and we need to start it now. For this reason education planners and researchers need to find answers to the following questions:

- How can we support the issues of green development and sustainable development in the political and social process?
- How can education planners and teachers assess the fields of work involved in greening TVET, and how can they choose learning objectives that relate to green issues?
- How can education planners and teachers integrate green concepts into the curricula of TVET schools and companies?

What role should vocational education management play in this process?

- How can we design green TVET concepts so that they also take into account existing challenges and deficiencies with which politicians, employers, teachers, trainers and education planners are faced?

Experts in TVET systems now need to discuss and develop concepts. There are now plenty of case studies about the situation in different countries. The practical work has to be done next, and this can also be successful if all the important players – companies, ministries, schools, universities and so on – work together. The biggest challenges will be to use the results of these studies, to integrate them into the development of green jobs, and to incorporate them into practical education and training programmes. There is not only a chance to set the further path of economic development, there is also a chance to consider the environmental and social aspects.

Education experts must never forget the role of people in all these concepts. Learning environments – what Shyamal Majumdar called green campuses – and learning conditions need to be organized so that students are motivated to learn. Training should be focused on students, and green development should not only be a theoretical subject. Students need to see in practice what it means to work in a sustainable way. They must also learn that they are responsible for themselves and for others. As well as being a part of the school community and of a place of work, they must think of themselves as a part of the social and environmental systems which they will have to consider in the future.

Additional resources

A number of resources were listed as preparatory reading for the moderated online discussion and more were added during the discussion period. Of course there are many other resources on the topic, but this list is restricted to those that were referred to as part of the online conference.

- Asian Development Bank (ADB). 2012. Green Growth, Resources and Resilience: Environmental sustainability in Asia and the Pacific. www.unescap.org/esd/environment/flagpubs/ggrap/documents/Full-Report.pdf (Accessed 11 November 2012.)
- ADB, CEDEFOP et al. 2012. Interagency working group on Greening TVET and Skills Development. www.unevoc.unesco.org/fileadmin/user_upload/docs/IWG_Leaflet_June21_2012.pdf (Accessed 11 November 2012.)
- Bonn Declaration on the role and contribution of TVET to sustainable development. http://p19035.typo3server.info/fileadmin/user_upload/pubs/SD_BonnDeclaration_e.pdf (Accessed 11 November 2012.)
- CEDEFOP. 2010 Skills for Green Jobs: European synthesis report. www.cedefop.europa.eu/EN/Files/3057_en.pdf (Accessed 11 November 2012.)
- International Labour Organization. 2011. Skills for Green Jobs: A global view. www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_159585.pdf (Accessed 11 November 2012.)
- ILO. 2011. Final Report of the ILO Online Forum 2011. www.unevoc.unesco.org/e-forum/FINAL%20Skills%20for%20Green%20Job%20Online%20Discussion%20Report.pdf (Accessed 11 November 2012.)
- Majumdar, Shyamal,. 2011. Developing a Greening TVET Framework, www.unevoc.unesco.org/fileadmin/user_upload/docs/

[Greening_TVET_Framework-Bonn-Final_Draft.pdf](#), (Accessed 11 November 2012.)

- Organisation for Economic Cooperation and Development (OECD) and CEDEFOP. 2012. Forum on Green Skills Summary. www.oecd.org/cfe/leed/Summary%20note_FINAL.pdf (Accessed 11 November 2012.)
- UNESCO-UNEVOC. 2004. Annotated Bibliography on TVET for Sustainable Development, www.unevoc.unesco.org/publications/pdf/AB1_TVETforSD.pdf (Accessed 11 November 2012.)
- UNESCO-UNEVOC/InWEnt. 2009. Reorienting TVET Policy Towards Education for Sustainable Development. Meeting report, www.unevoc.unesco.org/fileadmin/user_upload/docs/402-0002-2010_lowquality.pdf (Accessed 11 November 2012.)
- UNESCO-UNEVOC. 2009. Technology and Vocational Education for Sustainable Development: Empowering Individuals for the Future. Bonn.
- UNESCO-UNEVOC. 2009. Work, Learning and Sustainable Development. Bonn.
- UNESCO-UNEVOC. 2010. Integrating Sustainable Development in Technical and Vocational Education and Training Six Case Studies from Southern and Eastern Africa. www.unevoc.unesco.org/fileadmin/user_upload/docs/CS_vol2_ESD_Africa_Final.pdf (Accessed 11 November 2012.)

Useful links

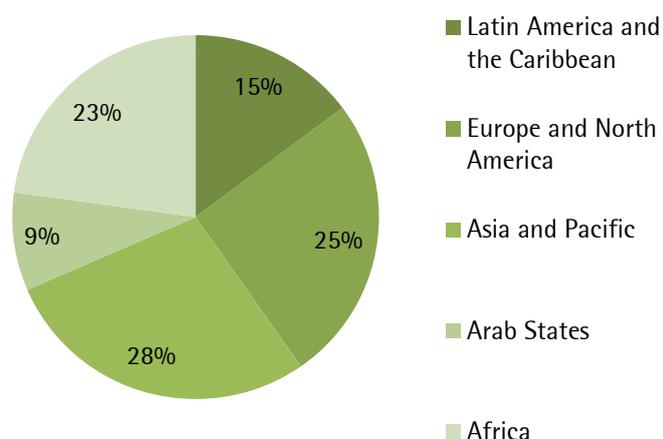
- UNESCO. 2012. Education for Sustainable Development. www.unesco.org/new/en/education/themes/leading-the-international-agenda/education-for-sustainable-development/ (Accessed 11 November 2012.)
- UNESCO-UNEVOC. 2012. UNESCO-UNEVOC and Greening TVET. www.unevoc.unesco.org/go.php?q=page_greening_tvete (Accessed 11 November 2012.)

Participation

Overview

- Number of participants: 149
- Number of countries from which participants came: 64
- Number of messages exchanged: 106

Regional representation



List of participants

Name	Institution	Country
Abdirasak Ibrahim	Oxfam Novib	Somalia
Abdul Antoine	UTech, Jamaica, Kingston	Jamaica
Abdul Aziz Binghtahith	Abha College of Technology, Abha	Saudi Arabia
Abid Munir	National Institute of Science and Technical Education Islamabad, Islamabad	Pakistan

Name	Institution	Country
Adevemi Ajiboye	Center for Business Incubation and Information Technology, Lagos	Nigeria
Aivan Amit		Philippines
Alice Tawil	UNESCO Iraq, Amman	Jordan
Alix Wurdak	UNESCO-UNEVOC	Germany
Amiri Kondo	national Council for Technical Education, Dar Es Salaam	Tanzania
Ana Mendes e Land	UNED (Spain) and Peace Corps	USA
Anita Sharma	InWent Capacity Building International, Regional Office, India	India
Avril Sampson	University of Trinidad and Tobago, Arouca	Trinidad and Tobago
Becki Loudon	Middle Tennessee State University, Murfreesboro, Tennessee	USA
Bertotti, Lucila Maria	Porteña	Argentina
Bhupinder Mandair	UNESCO, Santiago	Chile
Binttu Abinn		Philippines
Bramdeo	MITD, Phoenix	Mauritius

Name	Institution	Country
Brenda M Lazelle	PINZ (Polytechnics International New Zealand), Wellington	New Zealand
Carolee Buckler	Manitoba Education, Winnipeg	Canada
Carolyn Medel-Anonuevo	UNESCO Institute for Lifelong Learning, Hamburg	Germany
Chin Wei Keh	Tokyo Gakugei University	Brunei Darussalam
Chris Sims	Manipal City and Guilds	India
Christoph Büdke	GIZ	Germany
Daniel Ochieng	Nairobi	Kenya
Banker Schaareman	PT. Pugajinou (International Consultants), Jakarta	Indonesia
Debbie-Ann Robinson	HEART Trust/NTA	Jamaica
Diana Nikolaus	Otto-von-Guericke-University, Magdeburg, Magdeburg	Germany
Don Suraweera	University of Vocational Technology, Colombo	Sri Lanka
Dr Sunny Eshiotse	Auchi Polytechnic, Auchi	Nigeria
Dr Eila Heikillä	Independent TVET Expert	Finland

Name	Institution	Country
Dr Sandra Poirier	Middle Tennessee State University, Murfreesboro, Tennessee	USA
Duger Bujinlkhamb	Observatory and UNEVOC Center of Mongolia, Ulaanbaatar	Mongolia
Ehab Haggag	TVET Egypt	Egypt
Elfaith Waheed	Ministry of Human Resources Development, Khartoum	Sudan
Emma Kruse Vaai	Institute of Technology of the National University of Samoa, Apia	Samoa
Enkhalmgalan Dorjsuren	Vocational Training Center, Ulaanbaatar	Mongolia
Eric Po Keung Tsang	HK Institute of Education, Hong Kong	China
Esther Graupera Sanz	AFACI Castilla y León, León	Spain
Farshid Borhanazad	Technical and Vocational Organization	Iran
Francisco Javier Troncoso	UNWIN	Chile
Fuad Mehamed Yussuf	Nazrete	Ethiopia
Gao Shanyan		China
Gary Mar	University of Technology, Kingston	Jamaica

Name	Institution	Country
Ghulam Raza Hussain	Institute of Development Studies and Practices	Pakistan
Gibou Jobe	National Training Authority, Banjul	Gambia
Gifford Thomas	National Training Agency	Trinidad and Tobago
gilber Mzenzi Mabasa	Bulawayo Polytechnic, Bulawayo	Zimbabwe
Graham Russell	Plymouth University, Plymouth	United Kingdom
Halden Anthony Morris	University of West Indies	Jamaica
Harry Stolte	GIZ, Magdeburg	Germany
Hassan Alanbagi	UNESCO	Iraq
Hassani Mohsen	Association Ahalina, Skhira	Tunisia
Henry Fred Lutalo	African Evangelistic Enterprise Uganda, Kampala	Uganda
Husham Elnour	Algrief Technical College (NCTTE)	Sudan
Igor Besson	Montpellier SupAgro, Montpellier	France
Ilaria Vanzin		Jordan
Ingrid Robinson	Ministry of Education, Kingstown	Saint Vincent and the Grenadines

Name	Institution	Country
Israel Ikanem	Niger Delta Child-Friendly Village Ikot Ekpene	Nigeria
Issam Abi Nader	Vocational Education, Higher Industrial Technology, Dekwaneh Technical City	Lebanon
Jennifer Gerst	Millenium Challenge Corporation, Washington DC	USA
Jinu John	World Vision, India	Raipur
Joacjim Dittrich	Universitas Pendidikan Indonesia (Indonesia University of Education), bandung	Indonesia
Joanna Collymore	Ministry of Education and Skills Development, Gaborone	Botswana
Joseph W. Chironbo	Blantyre Trade Testing Centre, Blantyre	Malawi
Kadidia Doumbia		USA
Kai Gleißner	UNEVOC Centre Magdeburg, Magdeburg	Germany
Kenneth Barrientos		Philippines
Kinuthia Mugi	Meru University College	Kenya

Name	Institution	Country
Lafoucriere Celine Marie Claude	UNESCO, Santiago	Chile
Lahmine Soufiane	Al Akhawayn University in Ifrane, Ifrane	Morocco
Leesha Roberts	University of Trinidad and Tobago, Valsayn,	Trinidad and Tobago
Libbi Stovall	Dallas Trinity River Eco- School & Eco-Lodge, Carrollton	USA
Lily Wagner	North Clackamas School School District, Milwaukie	USA
Lisa Freiburg	UNESCO- UNEVOC	Germany
Luis Alberto Gonzalez Lara	LA Training and Development, Melbourne	Australia
Mahesh C Verma	Sared, New Delhi	India
Mani Sinha	Manipal City and Guilds, Delhi	India
Manuela Prina	ETF, Turin	Italy
Maria Susan P. dela Rama	Technical Education and Skills Development Authority (TESDA)	Philippines
Marlene Graham	EART Trust/ NTA	Jamaica
Martin Joseph Williams	T. M. Marryshow Community College, St. George's	Grenada

Name	Institution	Country
Matthias Wessler	UNISTAFF Associates, Hann Muenden	Germany
Max Ehlers	UNESCO- UNEVOC	Germany
Md Sakawat Ali	Bangladesh- Korea Technica Training Centre, Dhaka	Bangladesh
Menyha Alex Dan	FASERT, Kampala	Uganda
Mirvat Bulbul	Accreditation and Quality Assurance Commission	Palestine
Modesta E. Gavor	University of Cape Coast, Cape Coast	Ghana
Mohammad Kamal Yassin	Nesma & Partners - Nesma Training, Dammam	Saudi Arabia
Mohammed AL-Daffaie	MOLSA	Iraq
Mohsen Ilyas	G.T.T.I 96 H Gulberg Lahore, Lahore	Pakistan
Momoh, John	Federal Polytechnic, Ado-Ekiti, Ado-Ekiti, Ekiti State, Nigeria	Nigeria
Moustafa Mohamed Moustafa Wahba	Alexandria	Egypt
Mr.Amin Berkati. Hasibuan	EMIR- Dynamo and Electro Motor Workshop, Medan, North Sumatra	Indonesia
Mrs Lucy Ogol		Kenya

Name	Institution	Country
Mubarak Maman	Save the Children, Zanzibar	Tanzania
Muhammad Abubakar	National Board for Technical Education	Nigeria
Nafiseh Saberi		Iran
Naing Yee Mar	UNESCO-UNEVOC	Germany
Neida Siofontes	ULAC, CUMANA	Venezuela
Nissa Toledo		Philippines
Nizam	Community College, Perak	Malaysia
Ofentse Disang	Botswana Training Authority, Gaborone	Botswana
Olatuja Folajimi henry	Peak Technical and Vocational Centre, Benin	Nigeria
Olubodun Olufemi	University of Lagos, Lagos	Nigeria
Oluyinka Abayomi Otesile	Cyprus International University	Turkey
Omer Musa Ahmed	National Council for Technical Education and Technological Khartoum	Sudan
Oshaniwa Toyin	Nature Cares, Lagos	Nigeria
Osung Okon	Centre for Marine, Oil and Gas Technology, Oron	Nigeria
Ozlem Kalkan	Ministry of National Education	Turkey

Name	Institution	Country
Paul Awuntumah Avorkah	Community Development, Accra	Ghana
Peter Kalanzi	Education Finder, Helsinki	Finland
Philipa Omamhe Idogho	Auchi Polytechnic, Edo State	Nigeria
Priyanka Thompson	Manipal City and Guilds, New Delhi	India
Rabe Symphorien		Côte d'Ivoire
Rafael Barrio Lapuente	Public Administration	Spain
Ram Babu Adhikary	Council for Technical Education and Vocational Training, Bhaktapur	Nepal
Rameesh Madourie	University of Technology Jamaica, Kingston	Jamaica
Ramon Anibal Iriarte Casco		Japan
Rebecca Corley	MTSU	USA
Rina Arlianti	Tangerang	Indonesia
Robert Rothman	Newtown High School, Elmhurst	USA
Roxanne Campbell	University of Technology, Kingston	Jamaica
Sania Sabliic	Bania Luka	Bosnia and Herzegovina
Santosh Khatri		Cambodia

Name	Institution	Country
Shankara Subramaniam		India
Sharen Tay	Hiroshima University, Hiroshima	Japan
Sheryl Flugel Venter	Coastal KZN FET College, Durban	South Africa
Shyamal Majumdar	UNESCO-UNEVOC	Germany
Silei Li	UNESCO-UNEVOC	Germany
Silvia Boehmsdorff	GIZ, Hanoi	Vie nam
Simon Madugu Yalams	Abubakar Tafawa Balewa University, Bauchi State	Nigeria
Simone Hofner		Switzerland
Solange Isaacs	UFRO, Temcuo	Chile
Stefanie Hoffmann	UNESCO-UNEVOC	Germany
Sunanta Dechongkit	Pearson Education, Bangkok	Thailand
Tarikere Somanath	Toyota Technical Training Institute, Bangalore	India
Toby Cook	Wealth-builders	Australia
Umesh Motish	Government of India, New Delhi	India
Vinay Swarup Mehrotra	PSS Central Institute of Vocational Education	India
Voufo Joseph	MINESEC, Yaoundé	Cameroon

Name	Institution	Country
Wasiu Abayomi	University of Technology, Kingston	Jamaica
Yoko Mochizuki	UNESCO, Paris	France
Yonton B. Kessely Sr	Ministry of Education, Monrovia	Liberia
Yulia Rubleva	UNESCO-UNEVOC	Germany
Ziad Khan	Peace University, USA, Washington	USA
Zvakanaka Dondo	Chinhoyi University of Technology	Zimbabwe

About the moderator



The discussion was moderated by Mr Kai Gleissner from Otto von Guericke University, Magdeburg, Germany. In the context of his work for the university Mr Gleissner has conducted research in the area of sustainable development and international vocational education, and has contributed to various publications on this topic. Mr Gleissner is also the coordinator of the International Department at the Otto von Guericke University, which is part of the UNEVOC TVET for Sustainable Development Centre in Magdeburg. The UNEVOC Centre Magdeburg is a consortium of three institutions, Otto von Guericke University, the German Agency for International Cooperation (GIZ) and Fraunhofer Institute for Factory Operation and Automation (IFF).

Published by
UNESCO-UNEVOC International Centre for
Technical and Vocational Education and Training
UN Campus
Hermann-Ehlers-Str. 10
53113 Bonn
Germany
Tel: [+49] 228 815 0100
Fax: [+49] 228 815 0199
www.unevoc.unesco.org
unevoc@unesco.org

Photo used in Cover Design © Flickr/Agrilife today

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of UNESCO concerning the legal status of any country, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The author is responsible for the choice and the presentation of the facts contained in this publication and for the opinions expressed therein, which are not necessarily those of UNESCO and do not commit the Organization.



ISBN 978-92-95071-28-5
© UNESCO 2013
All rights reserved

