GERMANY: TVET FOR SUSTAINABLE DEVELOPMENT: POLICY-MAKING STRATEGIES AND PROJECT EXPERIENCES

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This chapter aims to help concretize the debate on how to achieve the objectives associated with the principle of sustainability, and to describe how vocational education and training can contribute to this process. A case-study approach to the topic has been chosen deliberately, so that concrete experiences and examples are used to illustrate ways of operationalizing the formulated policy objectives and achieving process-based implementation.

Hence, the examples of technical and vocational education (TVET) for sustainable development described below are also intended to document the fact that sustainable development can be understood only as a process; whilst it is possible to make qualitative progress towards its objectives, it is probably impossible to accomplish them completely in all their complexity. Science and research are always opening up new options for reconfiguring the economic, ecological and social spheres and adapting them dynamically to constantly changing conditions. The debate on sustainable development is aligned with the endeavour to shape societal and economic development in such a way as to enable (environmentally) liveable conditions for the majority of the population. Yet while that continues to remain a very distant reality, the alarming outlook for the future indicates an immediate need for action. Options for a gradual reorientation of vocational education towards sustainability criteria are set out against the backdrop of current pilot projects, with the aim of documenting the scope for action and reform in this central area of education policy, stimulating debate on the issues, and initiating relevant cooperation projects.

A further aim of presenting this chapter to the UNESCO–UNEVOC community is therefore to make the documented findings from concrete joint action in TVET for sustainable development available to other educational planners and responsible parties. Such knowledge sharing is organized in cooperation with UNESCO–UNEVOC and those responsible for the United Nations Decade of Education for Sustainable Development.

Taking into account the whole debate about sustainable development, the German government has committed itself to systematically integrating the underlying principles of sustainable development into its policies (Federal Ministry of Education and Research, 2002). Referring to this background and its essential significance for the implementation of action, the chapter addresses the importance of focusing on ways of securing sustainable development through initial and continuing vocational education and training.

High priority is being attached in this context to providing orientation for vocational education and training for the move towards a quality approach which integrates the principles of sustainable development. The long-term sustainability of benign work and production structures can be ensured only by gaining the informed and active involvement of suitably skilled staff-from skilled workers to the management level. Therefore, the remaining next sections describe

- policy-making as one fundamental prerequisite for the implementation of vocational education and training for sustainable development;
- the example of a pilot scheme for the development of necessary qualifications in the field of bioenergy as one means of initiating sustainable rural development;
- the significance of qualified training staff and the need for training content;
- the potential of information and communication technology (ICT) for global knowledge sharing.
NATIONAL POLITICAL INITIATIVES TO FOSTER VOCATIONAL EDUCATION AND TRAINING FOR SUSTAINABLE DEVELOPMENT

The German government’s strategy for realizing concrete action in pursuit of the goal of sustainable development is a process-oriented approach. As one means among many others, it commissions a wide variety of highly professionalized experts to undertake frequent reports and studies analyzing the importance of vocational education and training for sustainable development. They advise decision-makers to fund research and development (R&D) projects that play a direct or indirect role in preparatory activities to shape vocational education and training for sustainable development:

R&D is used not only to tap new knowledge but also for developing innovative methods, concepts, processes and strategies for giving the concept of sustainability a more concrete form and subsequently implementing it. The German government is therefore extremely interested in increasing the amount of research and development findings that are put into actual practice in society (transfer of knowledge) (Federal Ministry of Education and Research, 2002, p.24).

Taking into account the specific needs and demands of the world of work, the so-called sustainability triangle, integrating environmental, economic and social aspects, needs to be given a more appropriate definition for this field of action. Every occupational activity, be it manufacturing, maintenance or a service, uses materials and objects which contain environmental resources in natural or in processed forms. There are no occupations which do not have either direct or indirect links with the environment. Occupational activities therefore pose inherent risks to sustainable development, but also have the potential to alleviate the pressures which militate against it.

Environmental assets such as clean water, clean air, uncontaminated soil and a stable climate are the bases not only of the very existence and future of all forms of life, but also of agricultural, industrial and artisanal production. As well as strengthening the domestic market, sustainable development expertise and know-how can develop into a sought-after export line. Implementing a policy of efficient management for sustainability and corresponding training for all members of the workforce has the direct effect of creating business advantages, such as avoiding corporate costs by reducing energy, water and resource consumption, by sorting and recycling waste and by reusing packaging.

Economic management that complies with the principle of sustainability can be determined on the basis of three fundamental management criteria, against which the sustainability of products, production processes and modes of conduct can be measured:

• **Regeneration.** Renewable natural resources such as timber or fish stocks must be exploited in the long term only within the limits of their capacity for regeneration, lest they be lost to future generations.

• **Substitution.** Non-renewable natural resources, such as minerals or fossil fuels must be exploited in the long term only to the extent that their functions cannot be substituted by other materials or sources of energy.

• **Adaptability.** The release of substances or energy must not be greater in the long term than the adaptability of ecosystems, e.g., the climate, forests and oceans.

A modern, far-sighted policy which intends to shift towards (a strategy of) sustainable development therefore attaches particular importance to companies and their workforces implementing
sustainable development measures on their own initiative. This enables education policy-makers to find a more practice-oriented understanding of sustainable development and its demands to inform their discussions with representatives of the world of work.

Continuous optimization and reform of production structures are essential procedures for ecology-minded corporate processes. Corresponding training provision for all members of the workforce, from skilled workers to management, is a key factor in making this continuous improvement process possible.

Seen within this context, knowledge and skills relating to sustainable development – both during training and in the working life proper – become quality factors which are in high demand for any workforce that is both aware of and competent in its actions. Training personnel play a major role in developing sound training programmes that follow the philosophy of sustainable development, and must therefore be equipped with the relevant competences themselves.

Despite much effort and recognition of the necessity for more sustainable, benign production procedures, there is still further ground to cover in integrating education for sustainable development into vocational education and training and institutionalizing it in corporate practice.

All important documents, resolutions and recommendations over the past 10 years have stressed again and again the significance of vocational education and training for the realization of sustainability goals. However, there is still insufficient awareness, acceptance and a concrete definition of conceivable fields of action.

Based on these findings, the German government decided to launch a target-oriented action programme on vocational education and training for sustainable development. It commissioned the Federal Institute for Vocational Education and Training (BIBB) with

- the management of the preparatory phase of this programme
- all activities related to its implementation
- monitoring and evaluation and
- knowledge transfer into the vocational education and training community.

The aim of the preparatory phase was to create an appropriate foundation for making decisions about the realization of an action programme. It was announced by the Federal Ministry for Education and Research in 2003. The duration of the programme was scheduled for up to five years from its launch in 2004.

**Figure -19.1 Overview: coordinated action**

Within the first phase of the action programme, five pilot schemes in specific occupational fields were realized:

- renewable resources and rural development (bioenergy)
- training for sustainable development in skilled trades
- the automotive components industry
- building and facility management for sports facilities
- process automation in the industrial sector

Concrete results of these pilot schemes are expected soon. Initial impressions indicate that a high amount of authentic content-related training material has been generated, especially for trainers. Of the pilot schemes listed above, the one dealing with renewable resources (bioenergy) will serve as an example to illustrate the expected outcomes.
REN WWALS AND RURAL DEVELOPMENT

German agricultural policy is based on the common agricultural policy (CAP) of the EU. A central element of the CAP is an integrated, sustainable policy for agriculture and for rural regions, paying increasing tribute to environmental interests. Ongoing WTO negotiations and the recently expanded EU with its new central and eastern European members will also have a considerable influence on the sustainability of German agriculture. Moreover, the Kyoto Protocol, which is intended to minimize the CO\textsubscript{2} problem of raw fossil materials and fossil fuels for the sake of mitigating climate change cannot be left out of the equation. In this context, agriculture will face a substantial modernization process that will also extend to its preliminary and its downstream purviews.

Figure -19.2 Pilot scheme: skills and qualifications in using bioenergy in rural areas

Interest in making use of domestic biological materials as a source of energy and raw material will grow significantly, mainly driven by the demand of small and medium-sized industries. Both sectors will be part of the sustainable development of rural regions. Apart from these very different ways of using agricultural products, however, both traditional agriculture (food) and the so-called ‘new agriculture’ (non-food) will ultimately face the same problems with respect to recycling and disposal.

Renewable primary products fit perfectly into the frame of sustainability. For agriculture and forestry, however, they represent innovative products, processes and services. In producing biogas from liquid manure, for example, agriculture will benefit from multiple sustainable effects: the combined generation of power and heat/cooling, the environmentally friendly treatment of liquid manure, reduction of emissions and, finally, better availability of nutrients for crops.

Rapid future growth is expected in this market and likewise in the demand for information and education on how various natural resources in agriculture and forestry can be used, either as energy carriers or as a source of raw materials. At the same time, social changes and society’s changing expectations will accelerate this process. Therefore there is an increasing need for specialized, professionally qualified personnel and consultants in rural areas with expertise all along the production, processing and recycling chains involving these materials.

In the process of disseminating bio materials in the market and attracting consumers to renewable energies and materials, information can be regarded as a key to success. This demands a rethink in vocational education and training. Thus, the opportunities for vocational education and training in supporting the current process of market development for renewable primary products are tremendous. The main actors confronted by these new opportunities come from the following sectors; (a) public services and governmental institutions, (b) agriculture and forestry, (c) manufacturing industry, (d) retail sales, (e) consumers, (f) waste management/energy industry and (g) education and training.

What a new interdisciplinary concept of education in renewable primary products needs – in addition to an overall strategic approach geared towards sustainability (economy, ecology, society) – is a sound analysis of how to develop new energy and material products and recovery lines. Furthermore, it will be necessary to investigate regional possibilities for creating additional value for agriculture and forestry as well as for local industry in the form of modern, sustainable recycling management. Additional aspects to be taken into account are how educational goals and qualification needs can be incorporated into educational practice.

The educational initiatives of the EU should be also kept in mind, especially with regard to the national economies of the new EU member states in central and eastern Europe, which are highly dependent on the agricultural sector. It is already evident that these countries are confronted with an
urgent need for concepts for sustainable (rural) regional development, the know-how to implement them and corresponding quality management systems.

Many developing countries face the same problems, particularly the need to find ways of halting or minimizing migration from rural areas to urban areas. A powerful strategy to modernize rural development, focusing on renewable energy, could make a decisive impact in addressing the challenge of migration. Qualification strategies, additional forms of employment, income-generating opportunities and regional development would symbolize this new and sustainable value chain for rural development.

Figure -19.3 New perspectives for rural areas

With respect to the first results of the pilot scheme, a new set of qualification needs emerges. In agriculture, new possibilities arise to develop continuing education programmes for the profile of an ‘energy and raw material farmer’. To accommodate this development, the necessary educational thrust should involve such topics as recycling management, regional planning, marketing, technology transfer and waste management. Sound knowledge and qualifications are necessary in relation to sustainability, renewable primary products for energy and material recovery, ecologically sound integrated product systems and modern processing and fabrication technologies. As biological waste treatment enters the new markets successfully, it will round off the picture.

Farmers need to be skilled at thinking not only in their own, farm-related dimensions but also in regional dimensions in order to open up and enter new supply markets, to provide themselves with energy, heat and biofuel or to feed their locally produced energy into public grids either for electricity, heat or gas. This requires knowledge about biogas plants, biomass cogeneration plants, esterification plants and so on.

TOUCHING GROUND (1): A DIDACTIC APPROACH TO TEACHING AND TRAINING

The principle of sustainable development calls for an integrated approach to ecological, cultural, social, economic and global considerations. The prospect of full integration here cannot be guaranteed in the long term by the instruments of science, technology, economics and law alone. If the principle of sustainable development is to be implemented successfully, there is also a need for education, training and the development of competence in all fields.

Teachers and trainers frequently face the problem of how to integrate the issue of sustainability into the instruction they provide at college or the workplace. They play a decisive role in developing an understanding and awareness of sustainable development in initial and continuing vocational education and training. From personal experience they know how difficult it can be to put across the message that sustainable development starts with one’s routine activities in the workplace. Indeed, working effectively alongside the triangle of sustainability is more than just a matter of applying technical expertise and complying with regulations and standards. In many instances there is a lack of teaching and training materials which are applicable to operations in the workplace and which motivate students and trainees to ensure that their conduct is in line with the principle of sustainability.

In the light of this situation, BIBB has developed an interdisciplinary concept to support teachers and trainers in their efforts to integrate the demands of sustainable development into the practices of vocational education and training in a systematic and practical manner. The concept was developed in co-operation with teachers and trainers working in vocational education and training in the new
(eastern) federal states of Germany; where it was tested in companies, in vocational training centres and in vocational colleges. It is now being used in the form of manuals on education and training for sustainable development relating to the following industrial sectors: industrial metalworking, sanitation, heating and air conditioning engineering, construction, motor vehicle, chemical and commercial occupations.1

The education and training concept can be used to support the development of occupation-related skills based on the principles of relevance and practical action. It contains everything required to prepare and deliver the relevant training and instruction. The contents, goals and methodologies have been carefully co-ordinated to facilitate a holistic form of learning.

Defining concrete learning goals is the first step in integrating environmentally relevant knowledge, skills and abilities into vocational training. The immediate goal of this integrative approach is to remove the barrier between occupation-specific skills, on the one hand, and skills relating to environmental protection on the other, so that the latter are seen and treated as a fundamental element of all activities in the workplace.

The ultimate goal of all environmental training measures is to acquire thorough proficiency in dealing with any aspects of sustainable development with a bearing on one’s occupational activity. This proficiency can be described as follows:

- accepting responsibility for sustainable development and being qualified to take action to protect it;
- having the ability to apply subject-related expertise and to share this with others;
- mastering the skills required for the proper handling of materials and processes which pose a hazard in terms of sustainable development;
- demonstrating sound conduct based on the principles of sustainability in the workplace and in one’s own private life, including in situations involving conflicting interests.

In this context professional competence also presupposes that all parties concerned display a readiness to change their behaviour accordingly.

Having measures of sustainability implemented by suitably skilled workers is an aim which promises benefits to every company in two respects. On the one hand, it averts hazards to people and their natural living environment. On the other, low energy consumption, the use of environmentally friendly materials and environmentally clean and sustainable processes, intelligent transport and logistics procedures and waste management concepts geared towards waste avoidance can reduce costs and, in the long term, enhance corporate competitiveness.

Each manual follows a standardized three-part structure:

- Introductory guidance on preparing the training and instruction;
- Cross-occupation and occupation-specific training content, e.g. on maintenance and recycling in industrial metalworking occupations, on timber protection and sorting and reducing waste on building sites in construction occupations;
- Systematized information on topic-related legislation and information sources, with a glossary.

This common basic structure attaches particular value to the advantages of repeat recognition in occupation-related education and training for sustainable development. The structure also allows for the planning and subsequent implementation of practically relevant training and instruction units on sustainability in the workplace, for example units on eco-audits, recycling and maintenance. The manuals not only describe various teaching and training methodologies, they also provide practical
hints and tips on their use. Each methodology gives the learner access to general problem-solving strategies.

The content has been systematically prepared and is presented in book form: the manual. Each individual manual leaves sufficient leeway for developing a personal approach to designing the learning process. All the teaching and learning materials have been designed to dovetail with each other and also leave scope for expansion. Thus, the learner is familiarized with the way in which proper maintenance practices make an important contribution towards a cleaner environment and simultaneously give a concrete action-oriented profile to the process-based approach of TVET for sustainable development:

- protecting the environment by means of proper maintenance (using products and devices for a longer time than previously)
- protecting the environment during maintenance operations and by means of alternative maintenance procedures (such as mitigating their environmental impact)
- protecting the environment by means of modernization (such as replacing outdated components).

The basic notions relating to maintenance work are explained in a concise and precise manner. Also provided are specially prepared examples and numerous photocopiable worksheets which are suitable for use by teaching and training personnel in demonstrating the environmental importance of proper maintenance at various steps in the training (e.g. maintenance analysis: the evacuation of air from a hydraulic system).

Again, following this training philosophy, the path to sustainable development can gain its own distinctive profile in the world of work.

These measures can, for example, increase the running time of plant and machinery-enhanced use of resources, recognize frequently occurring faults and environmentally harmful production modes and allow for corresponding measures – preferably preventive measures – to be initiated.

It becomes clear at this point, if not before, just how important access to up-to-date information is. Putting TVET for sustainable development into practice can be seen as a particularly pertinent symbol for a sheer plethora of sometimes contradictory information and a rapid decline in the half-life of knowledge valid at any particular point in time. More importantly, it demonstrates that certain steps in developing environment-minded training content do not need to be repeated time and again.

It has to be conceded, however, that the demands to be met by such education and training for sustainable development extend beyond the capacities of initial vocational education and training. It is essential to follow this up with subsequent advanced and continuing training measures which are specifically geared to an individual company and workplace.

GLOBAL KNOWLEDGE SHARING – USING THE POTENTIAL OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

The information society offers great potential in promoting sustainable development, democracy, transparency, accountability and good governance. Full exploitation of the new opportunities provided by information and communication technology (ICT) and of their combination with traditional media, as well as an adequate response to the challenge of the digital divide, should be important parts in any strategy, national or international, aimed at achieving the development goals set by the Millennium
Declaration (UN, 2002–2006). There is also a need for a people-centred approach that emphasizes social, cultural, economic and governance goals.

ICT so far has created the means and possibilities for the globalization of economics and labour, and national economies that cannot take part in this development will be at a serious competitive disadvantage. On a global scale, national economies need to keep competitive options open and to provide their populations with prospects of safeguarding their livelihoods in their own countries. To achieve this, it is necessary to build up and maintain access to network competence on all required levels.

ICT offer a fundamental opportunity to allow access to education and knowledge anywhere on our planet, without place and time restrictions. The Internet will develop into a global library with an overpowering influence as an information and knowledge database for all fields.

Access to this database, i.e. the provision of technological prerequisites, the availability of the necessary infrastructure and the training of personnel qualified to implement and control specific knowledge management systems will become strategic resources or, in other words, factors contributing to added value in all national economies. New software products, increasingly complex hardware, modern means of (mobile) communication and an ever-expanding supply of information demand the continuing adaptation of work practices and processes. Purchasing, production organization, marketing and sales, in short, the whole of business logistics, is changing visibly and at shorter and shorter intervals. ICT is the motor of these transformations and has in the meantime become an almost natural part of (modern) economic and production processes.

The integration of technology brings together educational methods, content, services, new media, the Internet and globally accessible information networks. The globalization of economies and labour markets implies the full utilization of international knowledge as well as its delivery on a global scale. Making use of globally available knowledge, in the interests not only of initial and continuing training but also of sustainable development, is bringing about changes that are being felt by all strata of society.

The technological platform for globally available information already exists: the world wide web (WWW), which is increasingly also being used as a platform for delivering knowledge worldwide. The development process can only be speeded up if the expertise and continuing training opportunities are available when they are needed and, of course, where they are needed. The WWW is thus becoming the basis for the globalization of knowledge, a universal, globally accessible library. This has its advantages, but it also raises two major problems: firstly, the problem of the authenticity of the knowledge made available, a problem which is manifested mainly in attributing authorship or authority of that knowledge and secondly, the problem of relating available knowledge to a continuing training need, to a problem in the workplace, which is manifested mainly as a search problem with lost-in-hyperspace effects.

The challenges for vocational training associated with rapid technological development thus move more and more into the field of vision of national educational policy efforts. Despite many residual problems, the use of modern educational technology is proving to be the central shaping factor for forward-looking vocational training.

Take off: thinking about an UNEVOC-based community of practice

One consequence of this emerging ICT-based technical and social mega-trend could be to launch a UNEVOC-moderated information technology (IT)-based ‘community of practice’ which could be fully integrated into the infrastructure of the UNEVOC website (n.d.). The drivers of TVET-systems could make full use of all available technologies from e-mail to video conferencing and application sharing. More importantly it would allow for co-operation and collaboration among learning groups located across the world, with a view to sharing and continually updating educational expertise and experience, co-operative learning and projects and what the practical application of this expertise and experience entails in the workplace. It would allow access to national and international or global (information and knowledge) resources and ultimately, it would allow international participation in educational know-how and form the basis of international standards for educational design.
The Dot Force concluded that, when wisely applied, ICT offers enormous opportunities to narrow social and economic inequalities and support sustainable local wealth creation, and thus help to achieve the broader development goals that the international community has set. ICT cannot of course act as a panacea for all development problems, but by dramatically improving communication and exchange of information, they can create powerful social and economic networks, which in turn provide the basis for major advances in development. (Dot Force, 2001, p.3)

In addition to technological and organizational questions, other issues which come to the fore in this connection are questions concerning the effective promotion of learning, didactic and methodological standards for learning software and network-supported learning provision, as well as the corresponding learning architecture. Education policy, especially, faces a number of further challenges. Here are just some of the many critical aspects which need to be clarified:

- How can we make use of the possibilities of the knowledge/information society for the benefit of everybody, of society and of the economy?
- What can we do to reduce the gap between those who use ICT for learning and training and those who have to manage without the use of ICT?
- Do we need new forms of quality management and new criteria for quality standards?
- What consequences does the use of ICT have for education and training systems?
- Where (in which sectors) and how should the state (public sector) take on an active role?
- What are the new responsibilities and roles for the stakeholders in guaranteeing the use of ICT in education and training?
- What role should the international community play in promoting improved training policies and their governance?

In spite of all the advantages which ICT offer to educational systems and the global economy as a whole, some very critical aspects of IT-based learning environments are still unresolved and build a barrier between the so-called ‘on-liners’ and ‘off-liners’. They include:

- The lack of a learning model to define the role of IT-based learning in the mix of education and training delivery;
- The absence of a sustainable business model for IT-based learning environments;
- The lack of a well-tested and relevant delivery technology and learning management system;
- The availability of Internet connectivity and the high costs of online Internet delivery (telecommunication infrastructure, fixed lines);
- Internet bandwidth;
- The availability of learning material and the high design and development costs of IT-based learning material;
- Learner support and the facilitation of learning, also linked to the absence of a tried and tested learning model;
- The maturity of learners and their willingness to migrate to IT-based learning;
- The acceptance of this medium by current educational representatives, like teachers and tutors;
- Accessibility;
- Web didactic approaches.3

The need for continuing training in the environmental field is expanding and the demand for manpower with ecological competence is growing, while the demand for ‘unskilled’ workers is declining. The requirement placed on companies and thus on their workforces for flexibility in adjusting to the need for sustainability in their operations will become even more pressing in future. The problem facing SMEs is that they do not run their own training divisions: they have to outsource environmental expertise and training from the market.

Continuing training thus becomes an operation involving space and time constraints and the dependence on trainers to which the company has to adapt itself. Continuing training is oriented towards subject coverage and training personnel; it is geared to the average standard of competence required in the market and the average worker. The laws of the market play a more important role here than environmental education as such. The focus is on the rapid (and costly) meeting of needs and on calculating the cost of courses rather than on determining actual knowledge requirements; so that what is received in return is global knowledge, rather than answers to one’s own specific questions.
Scenario one. The customer wants an environmentally sound product. The supplier needs continuing training to provide that product and books a seminar with an external training provider. The seminar is held three months later. The supplier then submits a quotation for the enquiry and discovers that the customer has long since bought from a competitor or has in the meantime acquired the expertise himself/herself. This leads to a loss of image and the erosion of customer loyalty.

In a global information and knowledge society, the conventional seminar format undoubtedly has nothing to contribute today to developing the necessary environmental awareness and thus, equally, to promoting the necessary environmentally sensitive conduct, as is shown by the scenario already described. The development process can be speeded up only if the expertise and continuing training opportunities are available when they are needed and, of course, where they are needed. This should be done by a community of practice and its services, as mentioned above.

Scenario two. The customer wants an environmentally sound product. The supplier makes enquiries at the national information centre for environmental education in vocational training – either immediately from the workplace or at home that evening via the Internet. He/she obtains information on the subject of the enquiry, on relevant regulations, standards, cost calculation models, profitability accounting and, if he/she so desires, a course on the subject which will be delivered via the learning method of his choice. He/she uses the information, submits a quotation and gets the job order.

Once such an information and continuing training opportunity exists, the intrinsic motivation of employers and their workforces will be optimally primed, precisely because that opportunity is there when they need it – on demand and just in time, because the content can be configured to suit the problems which the company is facing, and because the knowledge will be consolidated by being put to practical use (learning by doing).

All the continuing training measures are backed up by a hotline operated from 0600 to 2400 h. daily. The hotline can provide tutorial support online, make proposals for company-specific support provision and provide learning aids for self-managed learning which make use of the motivation driven by the problem at hand.

Alongside this online tutoring facility, an UNEVOC-hosted hypermedia community of practice could provide further possibilities for communication and co-operation. In this respect it could make full use of all available technologies from e-mail to video conferencing and application sharing. In a full run-time environment it could manage cooperation among learning groups located across the world with a view to sharing and continually updating expertise and experience on TVET for sustainable development and what the practical application of this expertise and experience entails in the workplace.

TOUCHING GROUND (II) – JUST IN TIME AND ON DEMAND

BIBB has attempted to address the consequences associated with IT-based information and knowledge management processes in terms of the organization of work and training. The introduction and use of e-learning in vocational education and training is one of the most popular tools in IT-based information and learning environments. It changes the activity and job profiles of training staff and sets new standards for the qualification of personnel. This has also prompted BIBB to draw up new forms of employee qualifications and develop alternatives to traditional qualifications provision by integrating modern ICT technologies. This has led to the creation of the training staff qualifications portal, www.ausbilderfoerderung.de (BIBB, n.d.a) In addition, the complementary tool www.foraus.de (BIBB, n.d.b) is a portal providing current information relating to initial and continuing vocational education and training. Collectively, subject to comparison, discussion and analysis alongside success stories of IT-based information and knowledge management tools in other UNESCO member states, both portals could serve as examples for the design, test and evaluation of a UNEVOC-hosted community of practice.

In spite of all positive impacts there is still a general lack of the coherent concepts required to translate these new (network-supported) approaches to information and work into a didactic framework and thus facilitate the process of conversion to work-integrated learning applications. Content providers have also signed up to this aim, and the sector is introducing its own initiatives and
business models in an attempt to establish a marketplace for digital media. The intention is to create broad-based and cross-sector content provision for e-learning that can be used interchangeably and in endlessly varying new combinations. In the long term, this has the potential to pave the way for the lower-cost production of digital media.

Against the background of these developments, BIBB is looking into the fundamentals of enabling the integration of electronic information into a methodological and didactic concept, with the aim of using this as a basis from which to investigate the learning potential involved. Debate is ongoing as to whether such electronic information can serve as learning modules for the purpose of (mobile) process-related qualifications. The course of developments in media and technology-based training is opening up opportunities to deploy digital media in the shape of (mobile) configured information, teaching and learning infrastructure, particularly with respect to in-company qualifications and service processes and in the sales sector, with its wide variety of service-related aspects.

The challenge here is to provide information systems offering ease of navigation and use, allowing content to be accessed easily and featuring learning elements that also contain qualifications components. The searchable information, moreover, needs to be presented in the form of the smallest viable learning units possible (granular units). In the interests of achieving the highest level of flexibility possible in terms of the reuse of content, it is vital to think in terms of sub-categorization into small learning modules that can be dynamically combined to form learning pages or exercises. The granular format and the structured clarity of learning content provision represent some of the key prerequisites for the convenient preparation of content for the purposes of media-based training that allows use in a variety of work-process related target formats and application scenarios.

The ever-increasing pace of technological change in production processes could ultimately lead to the decentralization of training, bringing with it new demands with regard to individual learning process support activities, both for the trainers and skilled employees providing training. Within this specific context, the promotion of self-directed qualification by means of information and knowledge management represents a further strategic challenge for trainees. Handling these opportunities and having access to them will remain one of the most challenging tasks for the international community in order to close the so-called ‘digital gap’. Delivering the great stock of experience, content and practice-oriented didactic approaches for TVET for sustainable development, just in time and on demand, would describe the main service task of a UNEVOC-hosted community of practice. Such access to existing information and knowledge would be a first and urgent step to support and improve education for sustainable development initiatives in many cases. It could strengthen and motivate decision-makers in this field to plan and realize individual national strategies, taking into account existing models, success stories and experiences.

NOTES

1 BIBB Research Project 3.3003, Umweltgerechte Berufsausbildung in den neuen Bundesländern – Maßnahmen zur Förderung der Qualität beruflicher Umweltbildung (Environmentally sustainable initial vocational education and training in the new federal states of Germany – measures to promote the quality of vocational environmental education). In the course of the project, a total of seven manuals for trainers, teachers and trainees were developed, tested and made available to the vocational education community (Federal Institute for Vocational Education and Training, 1999a, 1999b, 1999c, 1999d, 1999e, 2000a, 2000b). A seminar guide on the use of the manuals in routine training completes this product range. A particular quality feature is the methodological–didactic approach developed for all the occupational sectors listed above, which creates a distinctive profile for initial vocational education and training in compliance with environmentally sustainable principles. Finally, reflection on this thematic area from a philosophy of education perspective was undertaken in Härtel et al., (2000).

2 The conceptual framework of a community of practice refers to the process of social learning that occurs when people who have a common interest in some subject or problem collaborate to share experiences, establish (common) solutions, and develop a culture of communication and joint action. Etienne Wenger did use this definition in relation to situated learning as part of an attempt to ‘rethink learning’ (Wenger, 2000, p.7).

3 This list was discussed during the Pan European Regional Ministerial Conference in Preparation of the World Summit on the Information Society, (Banciu and Haertel, 2002).
REFERENCES


