



# TVET Teacher Education on the Threshold of Internationalisation

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# Preamble and Editors' Preface



## **Preamble**

This book has been written as a result of a conference commissioned by a collaboration of international bodies concerned with the development of Technical and Vocational Education and Training (TVET) in the global context. We are now living in an interdependent world where dynamic and rapidly advancing technology demands flexibility together with the facility to operate in newly evolving knowledge communities. The success of such knowledge communities depends largely on the ability of all stakeholders to share expertise, develop joint ventures, and share a common purpose for sustainable development. Ever diversifying market forces have serious implications for education, not least for the TVET sector, which represents a key contribution to the future direction and sustainability of economic growth.

China is a good example of a country which has experienced exponential growth in the economy over the past decade. As a result of this development, we have developed many new educational programmes including a range of vocational education training programmes. Not least for these reasons, the Ministry of Education in Beijing was happy to demonstrate China's commitment to the development of TVET by hosting this key conference at Tianjin University. In this respect the Chinese Ministry of Education (MoE) welcomes the joint efforts of InWEnt – Capacity Building International/Germany, the Ministry of Education (MoE) Beijing/China and the UNESCO-UNEVOC, International Centre for TVET, Bonn/Germany to bring this conference to fruition.

The focus of the conference was the Implementation of a Master Degree Standard for Teacher and Trainer Education in Technical and Vocational Education and Training (TVET) in East and South East Asia held in December 2005 in China. As China has undertaken much effort to strengthen its system of Technical and Vocational Education and Training (TVET) the conference marked an important forum for the sharing and development of current and future collective provision.

The conference was held at University of Tianjin/China: Tianjin University is one of the key universities in the area of TVET; having influenced the development in

TVET in general and having made significant contributions to the development of international co-operation with regard to TVET. This choice of venue is a key indicator of China's commitment to furthering international cooperation in this sector. One of the demonstrable outputs of this conference has been the comprehensive overview of the structure and possible content of Masters Degree programmes. The Chinese Ministry is committed to strengthening TVET provision and considers the development of high quality Masters programmes as a key element area, to improving the quality and status of TVET in China and in the international context.

We would like to take this opportunity to acknowledge contributions and efforts of InWEnt – Capacity Building International/Germany, the UNESCO-UNEVOC, International Centre for TVET, Bonn/Germany and Tianjin University for hosting this important international conference in China and more importantly for the sustainable partnerships which have emerged as a result.

## Preface

The UNESCO International Meeting on Innovation and Excellence in TVET Teacher Education took place in Hangzhou/China in November 2004. The main aim of this conference was to establish a platform for discussion about improving the quality of Technical and Vocational Education and Training (TVET). The focal point was the development and implementation of an international Master Degree Standard in teacher and trainer education in TVET.

One year later, in December 2005 the conference, from which this book derives its content, entitled „Development and Implementation of a Master Degree Standard for Teacher and Trainer Education in Technical and Vocational Education and Training (TVET) in East and South East Asia“, took place at the University of Tianjin in China. This conference represents an outcome of the close cooperation between InWEnt – Capacity Building International of Germany, the Ministry of Education (MoE) Beijing in China and the UNESCO-UNEVOC, International Centre for TVET, from Bonn in Germany, and set a precedent for the further development of Master degree programmes in TVET.

At the conference, various existing Master degree programmes were discussed in the context of the international framework developed in Hangzhou. Thus, the structure and content of Master degree programmes of Asian universities were introduced and discussed with particular regard to the implementation of the international framework together with broader aspects of provision impacting on TVET.

The book begins with key note papers which provide the reader with the (political) background to current developments in TVET. The subsequent three chapters summarise nineteen papers delivered by participants from different countries. All views and opinions expressed in these contributions are strictly those of the authors and do not necessarily reflect those of the editorial board.

Significant threads emerging from the conference presentations included debate and critical analysis of the identification of training needs, based on recent research findings and empirical evidence. In addition, discussions illustrated how standards in teacher and trainer education in TVET within the international Master Degree

Standard could be implemented under different national and often frequently changing policy contexts.

We hope that this conference summary will be of service to both researchers and policy makers involved in Teacher and Trainer Education in Technical and Vocational Education and Training (TVET) in East and South East Asia, as well as for the broader context of joint initiatives in the area concerned.

Magdeburg, April 2006

Frank Bünning

Zhi-Qun Zhao



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# Key Notes





**Rupert Maclean**

**UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training, Bonn, Germany**

# **Importance of Developing and Implementing an International Master Degree Standard for Teacher and Trainer Education in Technical and Vocational Education and Training**

## **Introduction**

At the very centre of quality technical and vocational education and training lies an effective interaction between teachers/trainers and learners. In fact, an overall improvement in vocational skills for employability and citizenship can only be realised if there is an improvement in the quality, effectiveness and relevance of teaching. Many, both in the developed and developing worlds, are increasing the emphasis they place on improving the capacity of technical and vocational education and training (TVET) systems, in recognition of the important role TVET plays in equipping individuals with relevant skills and knowledge for the job market. TVET can also better enable individuals to participate in social, economic and technological innovation processes. Therefore, embedding TVET into regional and national innovation structures is of crucial importance to the economic performance and social development of countries. Having a pool of skilled and knowledgeable people within the TVET industry is as important to the TVET industry as it is to the industries TVET serves.

The UNESCO office in Beijing and the UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training in Bonn (Germany), in partnership with the Chinese National Commission for UNESCO and the Chinese Ministry of Education, organised an international meeting to develop strategies to increase innovation and excellence in TVET teacher education. The meeting was held in Hangzhou, China, from 8 – 10 November 2004. Sixty-eight experts participated from

twenty-five countries, with a broad based representation from developing countries within the Asian region. Whilst there have been many international meetings of TVET experts organised by UNESCO, and many international meetings of teacher training experts, the meeting in Hangzhou was the first time that an international group of colleagues have come together specifically to address a range of issues pertaining to TVET teacher/trainer education. The meeting gave considerable time to discussing ways of improving the quality of TVET professionals through advanced study. Specifically, the meeting considered the idea of a master-level programme in TVET. What is surprising to some is the large number of developing countries that are interested in a Master's in TVET programme.

There were three outcomes of the Hangzhou meeting which provide the foundation on which our deliberations over the next two days will be built. They are:

1. Agreement on the value of the framework developed by a consortium of European academics as the basis for further investigation regarding an international curriculum framework for a master's degree in TVET teacher education and research.
2. Agreement on the value of establishing a new international association in TVET (called UNIP), in order to progress the idea of a masters programme and other issues; and
3. Participants endorsed the Hangzhou Declaration concerning promoting innovation and excellence in TVET through improving programmes for training the trainers.

Let me refer to each of these important initiatives in turn:

## **International Framework for a Master's Degree for TVET Teachers and Lecturers**

With regard to the International Framework for a Masters Degree for TVET Teachers and Lecturers, as the authors of the framework point out, it is the common consensus of opinion that the professionalisation of TVET personnel within the international community is of crucial importance for the pro-active development of co-operative relations; between workforce training and the innovation processes, and the application and implementation of the resulting ideas from the development

process.

The international framework curriculum for a Master Degree in TVET therefore aims to define:

- A set of quality criteria for the education of teaching and lecturing staff working in initial and further education and training;
- A basis for future international scientific co-operation;
- A basis for the mutual exchange of students, lectures and researchers;
- A framework that can form a basis for the mutual approval of students' credits.

It is apparent that there is a need for such a programme.

Global economic competition increases the pressure to produce high-quality products. High-quality products and high quality, value-added work are seen as being at the core of economic success for 21<sup>st</sup> century economies all over the world. This has lent added emphasis when one realizes the increasing importance of ICT skills and knowledge. With these challenges, education, training and human resource development has become of outstanding importance for sustainable and competitive development of virtually every country worldwide.

Research on regional innovation systems has shown that technological, economic and social innovation processes are deeply embedded in the regional environments of learners, trainers and institutions. The trend of transforming colleges and institutions of training and education into regional centres of competence, with a moderating and consulting function in those processes, can be observed all over the world, despite cultural and institutional diversity. It holds for tailored courses for medium-sized, or large companies in industrialised contexts, as well as for targeted skills training measures for the informal sector in the developing world.

Looking at in-company organisational development and restructuring, one can also see the increasing attention, which is being paid to learning processes. Training and education are increasingly integrated into production and work-processes to achieve a balance between implicit experience-led learning and systematically contextualised training processes. This results in an upgrading of the sphere of direct value – added work for individual learning careers. However, the sustainable exploration of the learning potentials of work processes needs highly developed expertise, in the

optimal design of complex arrangements for teaching and learning.

In both instances, learning is seen more and more as a life-long and 'life-wide' process, which not only takes place at the individual level but also at the organisational level. Both aspects confront those who are responsible for the shaping and design of learning processes with new challenges. Their task is to equip learners with the ability for lifelong learning with meta- and self-directed- learning competencies – and to moderate and stimulate processes of organisational and regional learning.

Worldwide, roughly two-thirds of the workforce is qualified at the intermediate level, which corresponds to technical and vocational education and training. Vocational education and training and human resources management can be seen as one of the key professions in the 21st century. Movements towards the professionalisation of education and training can be found in both in developed and developing regions. In the Global Setting reference can be made to both 'Globalisation and Localisation'. However, economic processes have been increasingly overcoming national borders or other barriers. Despite nationally specific features, common product and process standards have become increasingly binding. International co-operation inside multinational enterprises and between companies that function globally has become a key issue of sustainable economic success.

The implementation of an international framework curriculum for a Master's programme in Technical and Vocational Education and Training will facilitate a number of important matters, these being:

- This defined standard will establish a basis for national and international accreditation of course programmes and will allow for the development of an international credit transfer system;
- It will facilitate the international exchange of students and lecturers
- It will encourage the development of international co-operation on TVET innovation and research;
- It allows for the self-sustainable and long-term development of professional capacity in TVET;
- It helps to develop TVET to become an integrated force in national and regional innovation systems; and
- It helps to promote vocational disciplines which embody gender equity/equality; and intercultural understanding for student recruitment policy making processes.

As you know, a detailed description of the international framework has been developed which is readily available, including an outline of the structure of such a programme, information on the suggested modules to be taught and organisational arrangements to achieve successful implantation. During this international conference we will learn more about programmes being developed within individual countries.

## Formation of an International Association of TVET Professionals

The participants at the Hangzhou meeting agreed that there is an urgent need for the development of an international community of TVET professionals. It is believed that such a process needs an 'International Association of TVET Professionals' in order to improve the quality of TVET and to facilitate professionalisation of TVET at the international level.

Participants suggested that the course of action which started in Hangzhou be continued by establishing an international scientific community in TVET. The support for this initiative was offered by UNESCO-UNEVOC during the conference, and resulted in the establishment of UNIP, the UNITED TVET Network for Innovation and Professional Development.

To proceed, members for a Scientific Committee to be organized were elected during the closing session of the Hangzhou conference. They represented regions from all over the world, in both developing and developed countries.

The elected committee consists of:

Chair: Prof. Dr. Felix Rauner

Secretary: Dr. Joachim Dittrich

### **Members with regional responsibilities.**

**East Asia:**

Prof. Shi Weiping, Dr. Zao Zhiquan, Dr. Zhang Jianrong

**Central Asia:**

Dr. M. Mohammad Haghpahani,  
Prof. Syed Zargham Haider

**South East Asia, Pacific:** Prof. David Lim,  
Dr. Masriam Bukit, Prof. Dr. Jailani Bin MD Yunos

**Other developing Countries:** Prof. Dr. Che Kum Clement,  
Ms. Naing Yee Mar, Dr. L. Efison Munjanganja

**America:** Prof. Richards L. Lynch,  
Ms. Ana Maria Rosende

**Europe:** Dr. Pekka Kämäräinen, Dr. Norman Lucas

**Members with Thematic Responsibilities:**

**Quality:** Mr. Leung Manwey Joseph

The tasks of this committee over the past twelve months have been:

- to facilitate discussions on the development, tasks, structure, and organisation of UNIP in the future;
- to initiate the implementation of the association;
- to facilitate discussions on the implementation of master level degrees in TVET at the international as well as the regional level, and to support the worldwide exchange of information on those processes; and
- to prepare international and regional follow-up conferences, where, good and best practice examples should be exchanged.

Participants in the 2004 Hangzhou Conference indicated their expectations that these tasks can be carried out in cooperation, and with the support of, the UNESCO-UNEVOC International Network and other partners. The incremental approach to establishing an international association was chosen to reflect community development strategies, which should be used in order to provide equal opportunities for all regions in the world to participate in shaping the international and regional agendas on training and trainers in TVET.

## Hangzhou Declaration

The Hangzhou Declaration provides a crisp summary of the main deliberations at the meeting, and indicates the resolve of those who participated in the 2004 meeting to move forward with further developing and implementing an international Master's degree programme for TVET trainers.

The Declaration states:

"The UNESCO International Meeting on Innovation and Excellence in TVET Teacher/Trainer Education, held from 8-10 November 2004 in Hangzhou, China, organised by UNESCO-UNEVOC International Centre for TVET and UNESCO Office in Beijing in partnership with the Chinese National Commission for UNESCO discussed, inter alia, the following:

- The current marginalisation of TVET vis a vis general and academic education;
- The current fragmentation in the fields of teacher education/training of trainers for TVET;
- The need for developing higher degree structures in TVET education;
- The lack of an established research culture that should focus on the development of TVET; and
- The challenge in promoting intercultural understanding and knowledge sharing between and developed and developing countries."

Based on the discussions of the above, the 68 participants from 25 countries who met for the first time as a group agreed:

- That TVET should be developed into an internationally acknowledged scientific community;
- That sustainable, reproductive and innovative national scientific systems be developed and integrated into national systems of innovation;
- That the international exchange of learners and educators be accelerated;
- That the expertise in pedagogy of TVET should be linked to the vocational disciplines and to integrative perspectives on school-based and work-based learning;

- That an improvement in vocational skills for employability and citizenship can only be realized if there is an improvement in the quality, effectiveness and relevance of teaching, and
- That an effective interaction between teachers/trainers and learners lies at the centre of quality TVET.

We recognize that achieving these goals requires innovation and excellence in TVET. Innovation, scholarship, and research in all aspects of TVET must be accelerated if solutions to the challenges identified at this meeting, are to be found.

We therefore commit ourselves, in each of our own countries and organisations, to working collaboratively to improving TVET teacher/trainer education so that we may hasten the acquisition of quality skills development that may contribute positively to economically vital and sustainable communities.

## Conclusion

In order to help strengthen and upgrade technical and vocational education and training, it is clear that the establishment and implementation of a high quality Master's Degree for TVET trainers has much to contribute in this regard. UNESCO-UNEVOC will remain active in this area, since it believes that "Training the Trainers" is a key component to improving the quality and status of TVET.



Harry Stolte

InWEnt – Capacity Building International, Germany

# Capacity Building in TVET Staff Development in the Context of International Cooperation

## Introduction/Background

The international community has stressed the importance of international cooperation in general and in TVET in particular. This has been expressed in the following:

- Millenium Development Goals, e.g MDG 8.
- ILO/UNESCO Declaration Regarding TVET for the 21st Century
- UNESCO Revised Recommendation Concerning Technical and Vocational Education

These declarations illustrate the needs regarding international cooperation between the North and South, with the assistance of international organizations, to renovate and sustain technical and vocational education systems, with particular emphasis on the following:

- the need for developing countries to take ownership of technical and vocational education, and to increase their budget for this sector of education;
- the efficient coordination, within any given country, of international assistance activities;
- enhancing the sharing of intellectual property, including research and development, for the benefit of learners in all countries;
- recognition by all stakeholders, including international financial authorities, of the contribution of technical and vocational education to the maintenance of peace and stability, the prevention of social dysfunction, and of the need to incorporate support for this sector of education in their assistance to recipient countries.

InWEnt – Capacity Building International – is synonymous with human resources and organizational development within the context of international cooperation.

The programs and measures of InWEnt aim at promoting change on three levels, which are to:

- enhance the individual's decision-making competence
- increase the performance of companies, organizations, and administrations
- improve decision-making abilities and the capacity to act on the political level

InWEnt mainly cooperates with partners from developing countries, and to a certain extent is active in transition and industrial nations as well. InWEnt pursues the principle of networking in all programs:

- knowledge transfer between organizations and partner nations,
- learning from one another in cross-border knowledge communities, and
- communication via knowledge networks is seen as a vital contribution towards advancing development processes.

Within the framework of training, exchange, and dialogue, InWEnt combines face-to-face situations with e-learning modules and reaches participants worldwide via online courses. Moreover, InWEnt has structured its range of programs and measures along modular lines. This enables the organization to react flexibly, accurately, and quickly to client demands with customized solutions.

In view of all this, InWEnt promotes the establishment of regional and international networks of TVET.

## Guiding Principles of InWEnt's International TVET-cooperation

InWEnt's guiding principles of international TVET cooperation are derived from, and embedded in, frameworks and priorities of international development objectives and strategies, such as:

- Millennium Development Goals (MDG's) of United Nations
- Education for All Initiative (EFA)
- Education for Sustainable Development (ESD)
- Employment, Productivity and Poverty Reduction (EPPR).

These agreements of the international community are orientating around the balanced development of complex environmental, social, and economic sectors. They

are interrelated and have certain similarities:

- the MDG's provide a set of tangible and measurable development goals with which education and training is a significant input and indicator
- EFA focuses on ways of providing quality educational opportunities to everyone
- ESD offers an increased quality of teaching and learning in education for sustainable development
- EPPR focuses on investment in education and vocational training for employability and entrepreneurship.

In InWent's opinion, Vocational Education and Training can be understood as an interface between human beings, society, the natural environment, technology, production, and the economy. Therefore Vocational Education and Training plays an important role in the processes of social and economic development.

Vocational Education and Training is a decisive factor not only in the income and living chances of individuals, but also concerning the quality and efficiency of labour, and the competitiveness of companies, economic sectors, and regions.

Without qualified personnel, the launching, installation, operation, and maintenance of environmentally friendly technology is not feasible.

Vocational Education and Training boosts the productive potentials of individuals as well as of companies, which leads to greater options of employability for individuals, and greater opportunities for participation in the development of civil society.

## Focal Areas of InWent's International TVET Cooperation

InWent's role in international TVET co-operation, focuses on the following areas:

- Vocational Training Policy
- Management in VET/of Vocational Training Institutions
- Technology-oriented Training of Trainers
- Development of Modular Employment-oriented Occupations and Curricula
- Educational Technology in Vocational Training
- ICT-based Development of Teaching and Learning Material
- Labour market oriented training concepts and networks
- Human Resource Development in companies

InWEnt intentionally concentrates on:

- **VET policy:**

- a modern market economy, TVET policy design and delivery should be achieved through a new partnership between government, employers, professional associations, industry, employees and their representatives, local community and non-governmental organizations
- TVET being served by a diversity of public and private providers.
- TVET costs being shared, as much as possible, between government, industry, the community, and the learner. The government should provide appropriate incentives.

- **Management of VET/Vocational Training Institutions:**

- Administrators should be equipped with a broad vision of TVET as a vital element in personal, social, and economic development
- Administrators should keep up to date with new administrative techniques and trends. They should receive special training in the methods and problems associated with the specific features of TVET programmes, such as flexible entry and re-entry patterns, continuous training in the workplace, and relevance to the job market. This should include:

- A) management methods appropriate to educational administration, including utilization of information and communication technologies
- B) financial planning methods
- C) contemporary human resources management and development methods

- **Technology-oriented Training of Trainers**

- TVET teachers should possess the appropriate personal, ethical, professional, and teaching qualities. Good preparation will enable them to operate in, and adapt to, an ever-changing scientific, technological, and social environment

- **Development of Modular Employment-oriented Occupations and Curricula**

- Special emphasis should be placed on curriculum development, research concerning teaching, learning methods, and materials
- Given the necessity for new relationships between education, the job market, and the community as a whole, TVET should exist as part of the system of lifelong learning adapted to the needs of each country, and to worldwide technological

development. This system should be directed towards:

- o abolishing barriers between different levels of education
- o the creation of open and flexible education and training structures
- o the taking into account an individual's educational needs, the evolution of occupations, and jobs recognizing work experience as a part of learning
- o the development of educational structures and programmes on all levels centred on organized and flexible interchange between educational institutions, training institutions, and the job market
- o basing TVET programmes on analyses and forecasts of occupational requirements by national education authorities, employment authorities, occupational organizations, and other stakeholders

- **Educational Technology in Vocational Training**

- Full use should be made of contemporary educational technology, particularly the Internet, interactive multimedia materials, audiovisual aids and mass media. This should enhance cost effectiveness, quality of programmes, especially in the promotion of self-learning

- **ICT-based Development of Teaching and Learning Material**

- Professional preparation of TVET teachers should include
  - a) training in contemporary teaching techniques and aids, including information/communication technologies
  - b) training in how to create and produce appropriate teaching materials, including modular and computer-aided instructional materials, whenever such materials are in short supply

- **Labour Market Oriented Training Concepts and Networks**

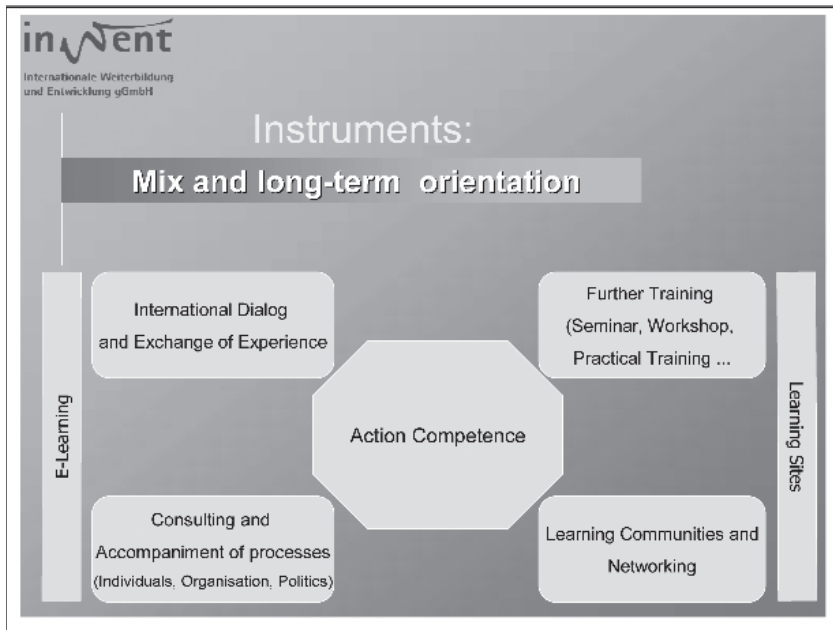
- TVET planning should respond to national and, if possible, regional, economic, and social trends, to project changes in demand for different classes of goods and services, and for different types of skills and knowledge in such a way that technical and vocational education and training may easily adapt to scientific, technological, and socioeconomic changes. This planning should be also be coordinated with current and projected training action, and the evolution of the job market in both urban and rural areas.

- **Human Resource Development in Companies**

- Businesses should be actively involved in the theoretical and practical training of those preparing for occupations in their particular sector, and should interact with educational institutions regarding the organization of such training.

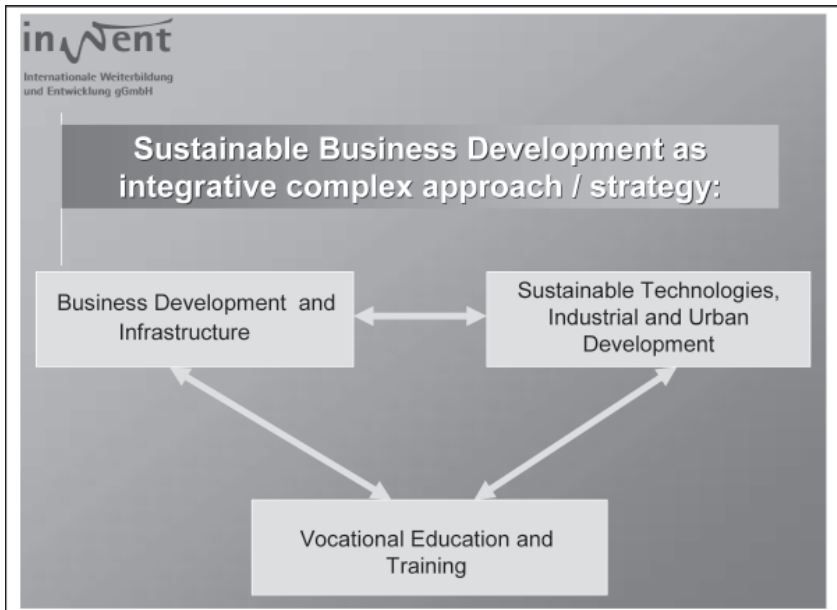
The implementation of special projects – mostly those developed for specific countries-context – is realized in the form of a certain mix of 'tools', such as

- long-term (up to one year) fellowship training programs
- various kind of training measures (seminar, workshop, traineeship, e-learning)
- learning communities and networks
- counselling
- coaching



The performance range aims toward specific target groups including areas of formal and informal Vocational Education and Training for youth and adults, as well as workplace oriented in-plant training.

Depending on specific demands, products and modules can be offered by InWent. Furthermore, under certain circumstances, it could be useful to combine inputs and approaches of Vocational Education and Training with other areas, as shown below in the case of sustainable business development:



Following the intentions of MDG 8 (Development of Global Partnership for Development), InWent combines the realisation of projects in developed countries with activities in developing countries.

## Multi-level Approach in InWent's International TVET-Cooperation

As mentioned above, Vocational Education and Training can be understood as a crossing point between human beings, society, nature, technology, production, and economy.

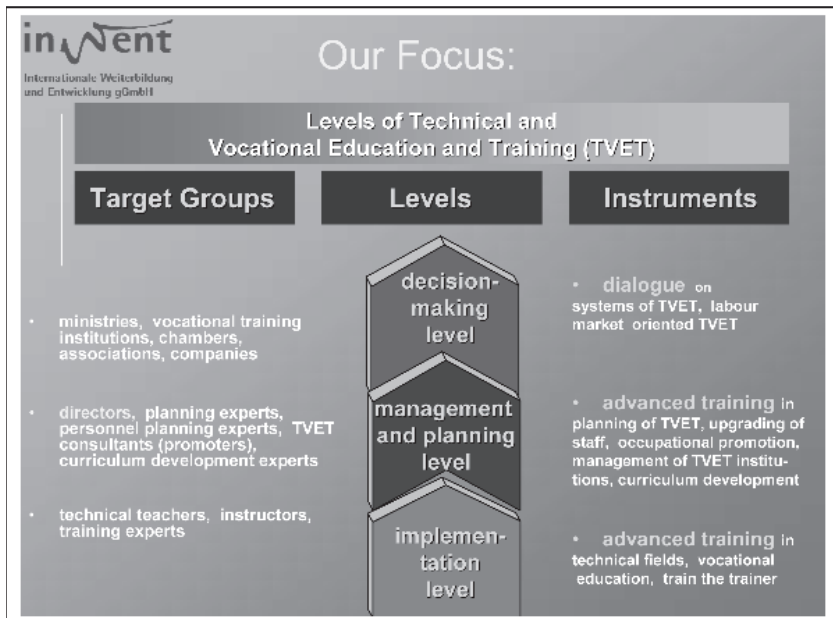
With this background it is clear, that various actors from different sectors influence

the development of the Vocational Education and Training sector.

That means, that the interest of different actors and sectors must be taken into consideration, if planning in Vocational Education and Training should be done. Stakeholders and representatives of different interest groups have to be included in preparation and implementation of TVET projects to ensure sustainability.

If one focuses on the Vocational Education and Training sector itself, there is the comparable situation regarding various actors and levels, which have to be taken into account.

The figure below shows InWEnt's understanding of target groups, levels and instruments in Vocational Education and Training sector:



Depending on the specific goals that aim to change and/or modernize the Vocational Education and Training sector, relevant stakeholders of these levels have to be involved from the beginning in the planning, elaboration, piloting, implementation, and realisation. It is also useful to involve relevant stakeholders from other sectors, e.g. industry, labour market.



# Basics for the Realization of InWEnt's Capacity Building Approach in International TVET-Cooperation

The following points illustrate, how InWEnt is realizing the Capacity Building approach in international cooperation in the field of TVET:

- Concepts, approaches, and inputs are fully integrated into already recognized international development policies and strategies,
- A strong cooperation with other national and international agencies and organisation is realized,
- Concepts and approaches in project frameworks are, in principle, demand driven,
- Focal points are internationally relevant and recognised,
- A multi-level approach, combined with a strong stakeholder involvement, is in practice,
- Appropriate use of instruments with long-term orientation,
- Main focus is oriented on empowerment of multipliers, and establishment of ownership of partner institutions and organisations,
- TVET approaches and concepts strongly orient themselves to the real labour market,
- Cooperation with national and international experts and centers of excellence in the sector,
- Cooperation with the private sector is in practice,
- International learning communities, e-Learning approaches, and e-networking,
- International alumni-networks in the relevant sector.



**Felix Rauner**

**Joachim Ditttrich**

**UNIP – United TVET Network on Innovation and Professional Development**

## **Increasing the Profile and Professionalisation of the Education of TVET Teachers and Trainers**

The Hangzhou Declaration, on increasing the profile and professionalisation of the education of TVET teachers and trainers (UNESCO-UNEVOC, 2005), and the formation of an international network to implement the standards for the TVET Master's degree, are milestones in the history of technical and vocational education and training (TVET). For the first time, the international TVET scientific community in cooperation with UNESCO-UNEVOC has drawn up a catalogue establishing major disciplines of TVET teacher education. Thus the foundations were laid for the exchange of students and academic staff as well as for the establishment of international cooperation in setting up joint TVET Master's programmes. The catalogue of twelve vocational disciplines (see table 1) represents the occupational domains in which vocational education takes place.

Vocational colleges and universities now can draw on a disciplinary structure which allows for transparency, mutual recognition of programmes, and improved mobility of professionals and scientists. Furthermore, the Hangzhou framework also includes studies in the theory of vocational education, which are common to all vocational disciplines.

Of course it is important to use the open structure of these curricula for any necessary regional adaptations for both vocational disciplines and pedagogical science. University studies and training in each of the twelve vocational disciplines differ from country to country with regard to their application context. To give one example: professional work in agriculture has a different structural organization in China compared to northern Europe or the United States. With regard to the kind of products manufactured, regional particularities must be taken into account. This is even more true concerning the use of machines and tools, the types of work and work organisation, as well as the marketing of products. Substantially, however, university studies and vocational training in the field of agriculture, as a sub-discipline within

the vocational discipline of agriculture, food and nutrition, have a common basis and a considerable amount of shared curricular elements.

The Master's degree for TVET teachers is differentiated into various vocational disciplines, for instance "Master of TVET (Production and Manufacturing)". TVET teachers study a vocational discipline and pedagogical science, where it is advisable to link the pedagogical contents to the respective vocational discipline being studied.

Table 1: Twelve Vocational Disciplines as defined in the International Framework Curriculum

Vocational discipline	Topics	Vocational discipline	Topics
Business and Administration	<ul style="list-style-type: none"> <li>- Production and distribution of goods</li> <li>- Services</li> <li>- Marketing, administration, finances, insurance</li> <li>- Transportation, logistics, tourism</li> <li>- ...</li> </ul>	Education and Culture	<ul style="list-style-type: none"> <li>- Child and youth care nursing education</li> <li>- Adult education</li> <li>- Special needs target groups</li> <li>- Music and dance</li> <li>- ...</li> </ul>
Production and Manufacturing	<ul style="list-style-type: none"> <li>- Manufacturing</li> <li>- Mechanical engineering design</li> <li>- Supply engineering / environmental engineering</li> <li>- Automotive engineering</li> <li>- ...</li> </ul>	Leisure, Travel and Tourism	<ul style="list-style-type: none"> <li>- Travel</li> <li>- Sports</li> <li>- Tourist services</li> <li>- Catering and hospitality</li> <li>- ...</li> </ul>
Civil engineering	<ul style="list-style-type: none"> <li>- Construction</li> <li>- Wood</li> <li>- Surface and coating technology</li> <li>- ...</li> </ul>	Agriculture, Food and Nutrition	<ul style="list-style-type: none"> <li>- Agriculture</li> <li>- Food production</li> <li>- Domestic economy</li> <li>- ...</li> </ul>
Electrical and Electronic Engineering and Information and Communication Technology	<ul style="list-style-type: none"> <li>- Production systems</li> <li>- Building equipment</li> <li>- Information and communication technology</li> <li>- Media technology</li> <li>- ...</li> </ul>	Media and Information	<ul style="list-style-type: none"> <li>- Printing</li> <li>- Electronic-advertising</li> <li>- Electronic-customer-service</li> <li>- Sales promotion</li> <li>- ...</li> </ul>
Process Engineering and Energy	<ul style="list-style-type: none"> <li>- Applied sciences</li> <li>- Energy conversion</li> <li>- ...</li> </ul>	Textile and Design	<ul style="list-style-type: none"> <li>- Clothing production</li> <li>- Fashion</li> <li>- Interior design</li> <li>- Art and craft</li> <li>- ...</li> </ul>
Health Care and Social care	<ul style="list-style-type: none"> <li>- Health care</li> <li>- Clinical care</li> <li>- Personal hygiene</li> <li>- Nursing</li> <li>- ...</li> </ul>	Mining and Natural Resources	<ul style="list-style-type: none"> <li>- Mining</li> <li>- Oil and natural gas</li> <li>- ...</li> </ul>

## **Why a Master's Degree?**

During the preparations for the Hangzhou Conference, the question was discussed of why an international agreement on TVET teacher education begins professionalization at the Master's level and not at the Bachelor's level. I would like to recapitulate the results of our discussion in the preparatory group for the Hangzhou Conference, since this question has certainly not been raised and discussed for the last time.

1. In many countries, teachers at vocational schools have qualifications at the Bachelor's level – either formal or non-formal. The variety of settings corresponds to the conditions and traditions of vocational education in these countries. There are good reasons to tie in with these traditions and preserve the variety of paths towards the profession of TVET teachers. The introduction of international standards for the education of TVET teachers at the Bachelor's level is, therefore, far from being urgent and might actually be counterproductive.
2. If the qualification of TVET teachers ends at the Bachelor's level, and if there is no opportunity to qualify as a TVET Master, then the profession of TVET teachers cannot develop beyond the status of a semi-profession and will be excluded from research and development and the related international cooperation in the field. Only with the establishment of post-graduate programmes can the foundations be laid for the qualification of researchers and scholars required in a doctoral programme – and for the establishment of a TVET research infrastructure.
3. Innovation in the domain of vocational education and training, as in all fields of economic, technological and social innovation, depends on progress made in research and development. The qualification of employees for the intermediate employment sector is considered a key factor for economic prosperity, social development, and competitiveness. Therefore to establish Master programmes for TVET teachers also means providing a basis for research and development in the field of vocational education and training.
4. In many countries, vocational education and training has a low standing compared to general education and university studies – sometimes to the point of stigmatization. In other countries, on the other hand, TVET has a good reputation. This holds, for example, for central European countries like Switzerland, Austria, Denmark, and Germany. In all of these countries, the high

professionalism of teacher education contributes considerably to the quality and the high social standing of vocational education.

### **Implementing TVET Master's Programmes**

Defining the twelve vocational disciplines is the first step towards increasing the profile and professionalisation of the education of TVET teachers. However, this holds only if these disciplines can successfully be filled with substantial content. In this regard quite a number of university institutes and VET researchers have presented excellent examples of best practice and pioneering studies. My Chinese colleagues Dr Xu Han and Dr Zhao Zhiqun have presented excellent results which have proven to be major contributions to the professionalisation of teacher education. A ten-year joint project between Tongji University, the GTZ (German Agency for Technical Cooperation), and several German universities, including the Institute of Technology and Education of the University of Bremen, supported by the Chinese and German governments, have undertaken the first steps towards establishing a modern Master's programme for the vocational disciplines and occupational fields of electrical engineering and information technology, mechanical engineering, construction, and business and administration. In the past ten years, two substantial projects of the European Union have improved the prospects of establishing common standards for the education of TVET teachers (Grollmann et al., 2003). A European UNIP regional conference in February 2006 will discuss the implementation of the Hangzhou Framework Agreement in Europe.

Many TVET teachers and university lecturers who initially earned a classical university degree, e. g. in mechanical engineering or agriculture, and subsequently switched to a career as a teacher or lecturer in vocational education and training, legitimately raise the question of what the difference is between a vocational discipline and a classical discipline, such as engineering. We will address this question intensively during the forthcoming two days of the conference, and we will certainly find instructive answers based on proven examples. I therefore would like to confine my address to some general remarks in which I briefly characterise the professionalisation of TVET teachers by studying a vocational discipline.

### **The Professionalisation of TVET Teachers**

There are essentially four areas of responsibility for which TVET teachers have to prepare themselves during their university studies.

### **1. The occupations and corresponding subjects of the occupational domain**

It is possible to assign twelve occupational domains to the twelve vocational disciplines. Characteristic for this first area of studies is learning about the occupations and subjects of an occupational domain as well as their genesis, the procedures of their development and evaluation and the capacity to analyze local labour markets in order to draw conclusions for the training programmes to be offered by TVET institutions.

### **2. Analysis, Design, and Organisation of Professional Work Processes**

This domain, which is central for the professional work of a teacher, comprises the ability to conduct labour and work process studies in the respective occupational domain and the knowledge of the contents and organisation of skilled work in the field. This area of study is of particular importance in the technical vocational disciplines since professional tasks undergo rapid changes due to the implementation of advanced technologies. As a complement to the analysis of changing professional tasks and qualification requirements, there is also the question of how to organise professional work processes, e. g. implementation of lean management and effective structures of organisational development in the respective domain.

### **3. The Subject of Professional Work**

Usually, we distinguish between

- service-oriented,
- economic, and
- technical

occupational domains and vocational disciplines.

TVET teachers must have sufficient command of the subject they teach with respect to the aspects of professional work in the domain under consideration. Whilst an electrical engineer, for instance, prepares in his studies for the

construction of electrical processes and systems, a TVET teacher in electrical engineering has to study his discipline with a view to the selection, planning, configuration, installation, and maintenance and repair of electrical devices. In the same manner, the professional tasks of a medical doctor can be distinguished from those of a teacher who works in the education of nurses, since the treatment of a patient by a doctor and the care for the same patient by nurses require quite different skills. This is why "nursing" has developed into an academic discipline of its own.

#### **4. Analysis, Design, and Evaluation of Training Processes**

This area of responsibility refers to the didactic competence of TVET teachers. Studying this part of a vocational discipline qualifies one for teaching and for shaping learning environments in a given occupational domain. This includes the definition of learning objectives, the selection of teaching contents, using appropriate methods, as well as a command of the examination and assessment procedures.

In establishing Master's programmes for TVET teachers, the academic community does not start from scratch. In Germany, for instance, the first academic programmes at the Master's level were introduced in the mid-19th century, and TVET Master's programmes were finally established nationwide in the mid-1960s. There are similar experiences in many other countries. In China, TVET teachers are now educated in a large number of universities, and the implementation of Master's programmes has advanced considerably. Therefore the international scientific community, in the domain of technical and vocational education and training, is well prepared to organise the education of TVET teachers at a professional level in the course of the ongoing internationalisation of university programmes.

#### **International Co-operation in Research and Development**

There is a number of initiatives which aim to establish an international exchange of experience in the field of technical and vocational education and training. I would like to mention in particular the UNEVOC Network with its UNEVOC Centres, and the support it receives from the UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training. In order to build a similar structure for the field of TVET teacher education, the United TVET Network on Innovation and Professional



Development (UNIP) was established in Hangzhou in 2004, again with support from UNESCO-UNEVOC.

The Network does not yet have financial resources of its own. Up to now it has been living exclusively on the voluntary contributions of its members. Whether this situation will change in the foreseeable future cannot yet be predicted, because it is difficult to find institutions which are willing to provide financial support for such an international initiative.

For the time being, we have to rely on resources which are available from other – in most cases bilateral – co-operation agreements, and on the sporadic support from individual institutions. This conference is a practical example of this co-operative work.

I therefore would like to ask you to contribute, with your research and development skills in TVET teacher education, to the international discussion and to share your experiences with the international community. I believe that the UNIP Network offers a good forum for this purpose.

I am in the happy position to announce a contribution in this regard. The Institute of Technology and Education of the University of Bremen is a partner in two projects which are supported by the European Union within the framework of the EU-Asia Link programme, and which are related to the education of TVET teachers. The TT-TVET project, with partners from Malaysia, Indonesia, and Spain is to start soon and will develop trans-national standards for TVET teacher education. We hope that there will be helpful contributions to this discussion from the academic community. The project "Design of a Curriculum on Curriculum Development (DCCD)" with partners from Beijing, Malaysia, and Ireland, will make a contribution to the present conference, and it has scheduled a conference in Malaysia for April 2006, to which the UNIP Network has been kindly invited. These two projects will actively participate in the activities of the UNIP Network, and I wish to encourage other initiatives to join this international exchange.

I wish us all here at the conference success in the preparation of the next steps towards the implementation of modern Master's degrees. UNIP will, to the best of its abilities, try to be a support platform.

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## Chapter 1

# TVET Master's Degree Programmes Versus the International Framework Curriculum



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# The International Framework Curriculum for a Master's Degree in Technical and Vocational Education and Training (TVET): A case study of the implementation of a joint European-Asian Master's Degree Programme in TVET

## Background

The UNESCO International Conference on Innovation and Excellence in TVET Teacher Education held in Hangzhou, China in November, 2004 aimed, inter alia, at contributing international discussion and developments concerning the quality of teaching, learning, and scholarship in the field of Technical and Vocational Education and Training (TVET). It also met to develop and implement an international Master's Degree standard in teacher and trainer education in TVET.

The conference highlighted a shared understanding that the professionalisation of TVET practitioners/educators is of crucial importance for the proactive development of TVET in general. This is of particular significance in an increasingly competitive global market and is evidenced in discussions concerning the production of high quality products. "With these challenges, education, training, and human resources development has become of outstanding importance for a sustainable and competitive development in almost every country worldwide" (UNEVOC 2005: 13).

In this regard it seems to be paradoxical that "simultaneous convergence and divergence of education and training" (UNEVOC 2005: 14) can be observed in a global context. As economic developments are increasingly overcoming barriers (such as borders and trade restrictions), the implementation of an International Framework Curriculum of a Master's programme in TVET offers an opportunity for a consistent approach to TVET at a global level.

## Globalisation and Internationalisation of Higher Education

Internationalisation is high on the agendas of national governments and institutions of higher education in general. European programmes, such as ERASMUS, and networked universities, are just two examples of how the international dimension has been harnessed and developed in higher education over the past decade. The implementation of the international framework curriculum of a Master's programme in TVET offers a new opportunity for internationalisation in higher education. It can be seen as a 'blueprint' for future developments in international co-operation and internationalisation in general.

It is beyond the scope of this paper to analyse the many different definitions, interpretations and approaches to internationalisation in higher education. However, it can probably be so defined: "internationalisation of higher education is the process of integrating an international/intercultural dimension into the teaching, research, and services functions of these institutions." (Knight and de Wit 1997: 8)

The ever-evolving landscape of internationalisation in higher education is a significant development which has already made an impact on teaching and research. Internationalisation has moved from the margins of TVET to become a core concern. This being the case, it would appear to be safe to state that internationalisation is perceived as a key impetus for the further development of higher education. International interaction, sharing expertise, academic networking, and an enriched curriculum are just some of the benefits that are referred to when discussing the advantages of internationalisation in higher education. Of course, there are always two sides of every coin, and some aspects of internationalisation are perceived to have negative effects.

One of these negative effects may be the issue of funding. An increase in funding due to internationalisation could undermine the notion of higher education as a 'public good'. Internationalisation and globalisation may strengthen competition and, consequently, reduce co-operation among countries and institutions. The promotion of cultural diversity could be subject to erosion by an expansion of a single world language and the dominance of western cultures. Furthermore, the brain drain may increase as the international academic labour market evolves (Badley 2000, IAU 2003). However, internationalisation of higher education appears no longer to be an option. No institution and no system is immune to the impacts of internationalisation and no institution can continue to remain cut-off from international networks.

„We can now speak of an international higher education sector or a global higher education community" (IAU 2003: 21).

At the European level, the Bologna Process has ensured that the challenges of internationalisation are now embedded in the long-term strategic agendas of institutions of higher education. In 1999, the Ministers of Education of 30 countries signed the Bologna Declaration, which invited higher education institutions to develop a European sector of higher education (Bologna Process Committee - 1999). Both the Bologna process and Hangzhou Declaration underscore the increasingly urgent moves towards internationalisation and globalisation. Thus, the movement towards internationalisation has become of more immediate relevance to providers of higher education.

The Hangzhou Declaration, the Bologna Process, and the International Framework Curriculum provide the perfect backdrop for the development of new co-operative degree programmes in the area of TVET. The process of internationalisation outlined above calls for new approaches to the development of personnel in TVET, for both management and teaching staff. However, there is little evidence to suggest the acceptance of international co-operation in offering joint degree programmes. While it is already a common approach to co-operate internationally in the area of business administration, joint programmes in TVET are relatively rare.

One possible explanation for this apparent reluctance could be the diversity of educational systems operating across the world. Traditionally, education in general is an area which falls under a state's responsibilities, this means a strict autonomy in educational matters and excludes outside interference. Even though the subsidiarity principle in education is not questioned, the processes and developments initiated at the international level clearly demand broader and more flexible approaches to training TVET staff.

The following example illustrates how an Asian-European co-operation is implemented on the basis of the International Framework Curriculum of a Master's programme in TVET. A joint Master of Science programme (M.Sc.) has been developed and involves partner universities from three different countries: two from China, one from Vietnam, and one from Germany.

# A Multi-National Master's Degree Programme in "Technical and Vocational Education and Training (TVET)"

## Objective and Justification of the Project

The Otto-von-Guericke-University Magdeburg, in Germany, has developed an M.Sc. programme which operates over four semesters in co-operation with Southeast University (China), Tianjin University (China), and the University of Technology Education (Vietnam). The course is titled "Technical and Vocational Education and Training" and leads to a joint award. The development of national TVET systems in China and Vietnam is faced with several problems. Among others, initial and continual (in-service) vocational education and training of specialised personnel is still considered difficult and problematic.

The main reason for this is that these countries lack appropriately developed structures for their vocational education and training systems because of historic factors, mainly as the result of years of economic neglect. The lack of professionally trained personnel in public and private training institutions is also a significant factor.

These two points provided the driving motivation for the development of a course for the initial and in-service training of specialised personnel involved in TVET. For some years, the modularisation of courses and the introduction of graduated degrees have been discussed at a political level. These approaches, based on Anglo-American models, were designed to enhance the attractiveness of TVET courses to potential clients. The Department of Vocational Education and Human Resource Development at Otto-von-Guericke-University, Magdeburg, in co-operation with their Asian partner universities, provide an international course of studies that leads to the professionally qualifying degree "Master of Science in Technical and Vocational Education and Training" which is in line with the needs of both China and Vietnam. Otto-von-Guericke-University, Magdeburg is prepared to take on the functions of project co-ordination and management within the context of the development of a modular consecutive course. Through the development of this Master's degree programme, the Department of Vocational Education and Human Resource Development at Otto-



von-Guericke-University Magdeburg was obliged to consider new ways of teaching.

The course's internationalisation and the contributions of guest lecturers from the countries involved in the project are, among others, example of the new approaches taken to teaching and should contribute to the further enhancement of the international dimension within vocational education and training. The target development of experts in the field of initial and in-service training at a high level should serve as the foundation for the further enrichment of the personnel. Furthermore, by carrying out the project, it is the objective of Otto-von-Guericke-University to contribute towards strengthening the competitive edge of these higher educational institutions in an international arena, as well as to help further develop international structures in this promising area. In view of growing national and international competition, commitment in this sector is urgently required. Through this collaborative M.Sc. course, the project should make a significant contribution to expanding TVET structures and to support economic development in the Asian states, such as China, and Vietnam.

## Programme Structure and Content

Access to the programme can only be granted following successful completion of professionally qualifying degree (minimum Bachelor's degree). The course lasts for four semesters, and a total of 120 credit points (one credit point is equivalent to a workload of 30 hours) are awarded. The curriculum is structured according to modular principles and is bilingual (either Chinese-German or Vietnamese-German), which contributes to the students' internationally oriented training. In addition to the teaching being carried out by experts from all partner countries, students will have the opportunity of spending a part of their studies in different countries (e.g. at partner institutions of the Otto-von-Guericke-University); thus, the international dimension can be further integrated into the curriculum. These new innovations have a considerable effect on the courses' attractiveness and support the further development of the international profile, consequently contributing to a higher quality of education.

The table below summarises the modules included and indicates the share of responsibilities in the programme.

Table: Survey of Modules

No.	Modules	ECTS-Credits <sup>1</sup>		
		Partner <sup>2</sup>	OvG <sup>3</sup>	Total
1.	<b>Common Studies</b>	9		9
<b>Foundational Studies</b>		<b>23</b>	<b>17</b>	<b>40</b>
2.	<b>Foundations, Theories and Structures of TVET</b>			10
	Research Methodology in TVET	4		
	Theories of Vocational Education I	3		
	Vocational Education Psychology	3		
3.	<b>International Vocational Education</b>			4
	Comparative Vocational Education	4		
4.	<b>Shaping TVET I</b>			9
	Curriculum Development in TVET I	2		
	Measurement and Evaluation in Vocational Education	3		
	Instructional Technology I	4		
5.	<b>Shaping TVET II</b>			9
	Theories of Vocational Education II		9	
6.	<b>Shaping TVET III</b>			8
	Curriculum Development in TVET II		4	
	Instructional Technology II		4	
<b>Advanced Studies</b>		<b>12</b>	<b>9</b>	<b>21</b>
7.	<b>Vocational Didactics</b>		9	9
8.	<b>TVET-Management and Evaluation</b>			12
	Vocational Educational Management	5		
	Project Management	3		
	Management Psychology	4		

<b>Vocational Discipline and its Didactics</b>			<b>18</b>	<b>18</b>
9.	Vocational Discipline and its Didactics			9
	Introduction in the Didactics of the Vocational Discipline		3	
	Applied Didactics of the Vocational Discipline		3	
	Teaching and Learning Laboratory Work		3	
10.	<b>Studies of Practice in TVET</b>		9	9
<b>Area of Specialization</b>		<b>12</b>		<b>12</b>
11.	Specialization Module (compulsory module)			12
	Further Studies in the Vocational Discipline			
	Human Resources Development			
	Theory and Practice in Vocational Training			
	Comparative and International Vocational Education			
	Vocational Education for Special Needs Students			
	Educational Management			
	...			
<b>Master Thesis</b>		<b>20</b>		<b>20</b>
<b>Total ECTS–CP</b>		<b>120</b>		<b>120</b>

<sup>1</sup> ECTS-Credit-point (CP) is the equivalent to a workload of 30 (teaching and independent study) hours.

<sup>2</sup> Tianjin University (China), Southeast University (China), University of Technology Education (Vietnam)

<sup>3</sup> Otto-von-Guericke-University (Germany)

Summary:

CHN/VIETNAM 44 CP

Otto-von-Guericke-University (OvG) 44 CP

Master-Thesis (CHN/VIETNAM and OvG) 20 CP

Specialization (CHN/VIETNAM or OvG) 12 CP

Total 120 CP

## Course of Studies

### Preparation Phase

Before students start their regular studies as part of degree programme, they are required to attend extra language classes (German) in their mother countries.

### First Semester

Studies at Southeast University (China), Tianjin University (China), or the University of Technology Education (Vietnam). As part of their studies students attend extra German classes.

### Second Semester

Analogous to the first semester.

### Summer School

This will involve the further preparation of the Asian students in terms of language ability at a language centre in Germany, until appropriate structures are established at the Asian partner institutes. The summer school includes a language proficiency test. It is expected that students pass TestDaF (German as a Foreign Language) level 4.

### Third Semester

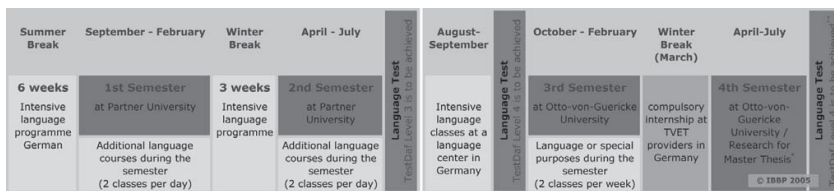
Students study at the Otto-von-Guericke-University in Magdeburg. In addition to their regular classes, students are offered classes for specialized terminology in TVET. Internship

During the semester break students do an internship at TVET institutions in Germany.

### Fourth Semester

Research for a Master's thesis at Otto-von-Guericke-University. Generally the Master's thesis is concluded at Otto-von-Guericke-University. In exceptional cases it may be finished at one of the partner universities in China or Vietnam. However, the thesis is jointly evaluated by one university teacher from the partner institution involved, and one university teacher from the Otto-von-Guericke-University.

The course progression is illustrated in the flow chart below:



\* The Master Thesis is to be started in Magdeburg in July and may be finished in the student's home country by October at the latest. It will be jointly evaluated by the partner universities.

\*\* Those students who have not passed the TestDaF level 4 have to pass the examination by the end of the master programme, otherwise a degree from Magdeburg university can not be awarded. However, they can still achieve the degree from the partner university.

Fig.: Flow Chart of Joint Master's Degree Programme in TVET

Currently, a guest lecturer chair is being applied for, which will be integrated into the concept of the course. The aim of this chair is to provide appropriate international expertise and at the same time develop personnel for the Asian partners, since apart from teaching commitments, the prospective guest lecturers will also work on research projects.

## Resume

Diversity can be both a strength and a challenge. Varying structures and practices in TVET at a global level make co-operation challenging. Internationalisation and global developments demand co-operation more than ever before. The field of Vocational Education has been an area in which co-operative international degree programmes are rare. The co-operative delivery of degree programmes has been practised in other domains more frequently, such as Business Administration and fields of modern sciences, e.g. Bio-engineering.

The implementation of the International Framework for Curriculum for a Master Degree in TVET provides guidelines for joint degree structures, and thus it can be seen as a milestone in international cooperation. The case study illustrated above shows how the framework curriculum is translated into actual degree structures.

The case of this multi-national Master's Degree programme in TVET exemplifies how the international dimension can contribute to strengthening higher education's competitiveness in an international context, as well as contributing specifically towards the further development of Asian-European economic development.

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# International Master Degree in Technical Teacher Education: The Case of Islamic University of Technology (IUT)

## Introduction

Islamic University of Technology at Gazipur, Bangladesh – commonly known as IUT – is a Subsidiary Organ of the Organisation of the Islamic Conference (OIC), representing 57 member countries. It was initially established as the Islamic Centre for Technical and Vocational Training and Research (ICTVTR) on the recommendation of the Ninth Islamic Conference of Foreign Ministers (ICFM) held in Dakar, Senegal in 1978. The foundation stone of ICTVTR was laid on 27 March 1981 on a 30-acre lot donated by the Government of the People's Republic of Bangladesh. It was renamed the „Islamic Institute of Technology" in the twenty-second ICFM Conference held in Casablanca in 1994. The current name, Islamic University of Technology, was approved by the twenty-eighth ICFM held in the Republic of Mali on 25–27 June 2001.

IUT was established with the aim of developing human resources in the 57 member states of the OIC in the fields of engineering, technology, and technical education for the benefit of the Islamic world. The main objectives include the imparting of engineering and technical knowledge at various levels, upgrading technical skills, conducting research, and sharing specialised technical know-how among the member states of OIC.

In order to achieve its objectives, IUT offers regular courses at the undergraduate and postgraduate levels. The different courses leading to a degree or diploma are offered by the departments of Computer Science and Information Technology (CIT), Electrical and Electronic Engineering (EEE), Mechanical and Chemical Engineering (MCE), and Instructor Training and General Studies (ITS).

In addition to the regular courses, the departments annually organise skill-upgrading and knowledge-updating short courses, seminars, and workshops at the national and international level. IUT also conducts technological and industrial research projects,

promotes technical cooperation, exchanges technical know-how, and disseminates basic information on the development of human resources among the Member States of the OIC. IUT ensures a coordination of the Institute's objectives with other national and regional institutions in other Islamic countries, as well as with other international institutions. It also conducts advisory and consultancy services for governments, international bodies, foundations, and allied organizations.

Depending on the specific needs and requests of any member state of the OIC, special courses are also arranged at mutually agreed locations and time.

All the students from the Member States of the OIC are provided with scholarships in the form of free tuition, board, housing, health care, games and sports facilities. In addition, a monthly pocket allowance of Taka (Bangladesh currency) equivalent of US \$ 40.00 is also given to each student. For the 4-year degree programmes in Engineering and Computer Science, students are to pay a small portion of the total expenses. All travel expenses to and from IUT are borne by the students or their nominating authorities. For all admissions, nominations are required from the respective governments of the OIC Member States. The IUT campus is located in a picturesque setting in Gazipur, 30 km north of Dhaka, the capital city of Bangladesh.

## OBJECTIVES

The Islamic University of Technology is basically an education and research institution. The main objective of the University is to help generally in human resources development in member states of OIC, particularly in different fields of engineering, technology, and technical education.

In fulfilment of its objectives, the University has the following functions:

- Providing instruction in engineering, technology, and in technical education, and in such branches of learning connected with the above fields as per requirement of the Member States and as approved by the Conference. In particular, training instructors, and technicians in technologies needed in the member states and to upgrade the mid-level and lower-level manpower to international standards.
- Conduct, promote, and guide research in engineering, in industrial and technological fields, and in technical and vocational education to the benefits of the member states of OIC.



- Hold examinations, grant and confer certificates, degrees, diplomas, and other academic distinctions to persons who have pursued courses of study provided by the University under such conditions as may be prescribed by the academic rules and regulations of the University.
- May confer other academic distinctions on persons of high eminence of the member states with the approval of the General Assembly on the recommendation of the Board.
- Promote technical cooperation, exchange technical know-how, and disseminate basic information in the field of human resource development through short and special courses, seminars, workshops, and publications.
- Ensure coordination of the objectives of the University with other national and regional institutions of the Islamic Countries, as well as with international institutions.
- Undertake advisory and consultancy services for government, international bodies and foundations, or allied organisations.
- Participate in the meeting of commissions and committees established by the Conference with appropriate background and technical papers.
- Cooperate and collaborate with the General Secretariat, and with other subsidiary organs of the Conference.
- Any other relevant functions as may be decided from time to time.

## ADMISSION REQUIREMENTS OF IUT

IUT offers programmes of various durations. The entrance requirements for different programmes of study for which enrolment is sought are detailed below:

For admission to the courses leading to the award of the Degree/Diploma of Master of Science in Engineering (M.Sc. Eng)/Master in Engineering (M. Eng)/Master of Science in Computer Science and Information Technology (M.Sc.CIT)/ Post Graduate Diploma in Engineering (PGDE)/ Post Graduate Diploma in Computer Science and Information Technology (PGD (CIT)) in any branch, a candidate must have obtained B.Sc. Eng. /4-year B.Sc. Degree in the relevant branch or equivalent from any recognised institution, having a minimum Cumulative Grade Point Average (CGPA) of 3.0 out of 5.0 or 2.5 out of 4.0 in the relevant Bachelor's programme and good performances in other examinations.

For admission to the course leading to M.Sc. Computer Science and Application

(CSA) and PGD (CSA), a candidate must have a Bachelor of Science degree in any field of engineering, or a 4 year B.Sc. Degree, or its equivalent with a sufficient background in Mathematics and IT.

The 4-year B.Sc. programmes in Computer Science and Information Technology, Electrical and Electronic Engineering, Mechanical, and Chemical Engineering require a Higher/Upper Secondary School Certificate in Science from a Board/University or its equivalent. The candidates are required to have good grades in Mathematics, Physics, Chemistry, and English. The Integrated Higher Diploma – B.Sc. Engineering programme has the same entry requirements as those of a Bachelor of Science programme.

The 3-year Higher Diploma in Engineering Programmes in Computer Science & Information Technology, Electrical, Electronic and Mechanical Engineering require a Higher/Upper Secondary School Certificate in Sciences from a Board/University or its equivalent. The candidate needs to have good grades in Mathematics, Physics, Chemistry, and English.

The Master of Science in Technical Education (M.Sc.TE) programme requires a Post Graduate Diploma in Technical Education (PGDTE) of IUT.

Post Graduate Diploma in Technical Education programme requires a Bachelor Degree in Engineering / Technology / Technical Education.

The 2-year Bachelor of Science in Technical Education (B.Sc.TE) programme requires a Diploma in Technical Education (DTE) or its equivalent, and the B.Sc.TE 1-year programme requires a Higher Diploma in Engineering of IUT or its equivalent.

The Diploma in Technical Education programme requires at least 3-year Diploma in Engineering/Technology after 12 years of schooling.

The Diploma in Vocational Education programme requires a Certificate in Vocational Education or its equivalent.

## THE DEPARTMENT OF INSTRUCTOR TRAINING AND GENERAL STUDIES (ITS)

The Department of Instructor Training and General Studies offers teacher education programmes to cater to the needs of professionally trained teachers and other educational personnel in the field of Technical and Vocational Education in the OIC countries. The programmes provide for three categories of entrants: Diploma Engineers, Higher Diploma Engineers, and Graduate Engineers,

The department offers five teacher education programmes: Master of Science in Technical Education, Postgraduate Diploma in Technical Education, Bachelor of Science in Technical Education, Diploma in Technical Education, and Diploma in Vocational Education. This is in accordance with the recommendations of the First Consultative Meeting of the National Experts on Curriculum Design and Staff Development, as adopted by the Fourth Meeting of the Board of Directors and the First Session of the General Assembly of IUT, and as approved by the Twelfth Islamic Conference of Foreign Ministers.

It is considered appropriate that effective professional preparation for teaching in technical institutions should involve pedagogical training as well as the enrichment and upgrading of specialised technical subject areas to a level higher than one's basic preparation.

Through a series of pedagogical and professional courses, the trainees develop competencies for improvement of the teaching – learning process, abilities to teach effectively in the classroom through the application of appropriate methods and techniques along with the use of innovative teaching aids and materials. Acquisition of administrative and supervisory competencies for running technical institutions, understanding of the principles and techniques of measurement and evaluation in order to apply them for improvement of the teaching – learning process, competencies for curriculum development, abilities for proper planning and management, skills in evaluating the outcomes of technical and vocational education, and designing and conducting educational research. The trainees further upgrade their technical knowledge in a chosen division of higher engineering as available in the University. In addition to the professional courses, the department offers general courses in languages, Islamiat, Islamic history, Science & Culture to all freshman entrants in the four departments of the University.

# THE MASTER OF SCIENCE IN TECHNICAL EDUCATION PROGRAMME

The Master of Science in the Technical Education Degree programme is targeted toward graduate students/trainers in Technical Education, i.e. teachers, trainers, training managers, educational administrators of the 57 OIC member countries participating in the programme.

The comprehensive graduate program in Technical and Vocational Education opened its doors in 1989. Its mission can be categorized into three parts: instruction, research and development, and service. The instructional component is addressed through the preparation of Technical and Vocational professionals through regularly scheduled graduate courses and internships directed by the Department of Instructor Training and General Studies. The research and development mission is realized, in part, through research papers directed by faculty members who have expanded their knowledge in technical and vocational education, while advancing in their professional practice. As it is the only comprehensive graduate technical and vocational education program sponsored by OIC, the Master of Science in Technical Education programme at IUT realizes its service mission through in-service activities and consultation with faculty at all levels.

## PROGRAMME REQUIREMENTS

The programme requires the completion of four semesters. This consists of 83 credit hours of course work, comprising 47.5 credit hours in the program core, 22 credit hours in a program specialisation, and 13.5 in thesis work. Candidates develop program concentrations in cooperation with their advisors. The two-year programme is divided into two semesters per year. One year is for the Postgraduate Diploma programme and the second year is for the Master of Science Degree programme. Upon completion of all course work, the candidate must take a three-hour written comprehensive examination. To remain in good academic standing, a student must not earn more than two grades below B, or one F. In order to graduate, students must maintain at least a 2.50 grade-point average. As previously stated, the Master of Science in the Technical Education programme requires a Post Graduate Diploma in Technical Education of IUT. Students have four consecutive years from the semester in which they are accepted to complete the master's degree and are expected to be enrolled every summer and winter semester.

Actually, the programme is designed in such a way that permits an exit after completing the one year postgraduate diploma. This is for those who could not get nominations from their government to attend the two year programme leading to the master's degree. However, they could return to IUT at any time to complete the M.Sc.TE programme, if they are again nominated by their government, and places are available.

Areas of specialisation for the Master's Degree in Technical Education include; Electrical Engineering, Electronic Engineering, Production Engineering, and Thermo-fluid Engineering.

## GRADING SYSTEM

IUT follows the Semester System to conduct instructions and examinations. An academic year consists of two semesters, each of sixteen weeks in length.

Each period of instruction per week in a theory subject or theoretical part of a subject constitutes one "unit" or 1.0 Credit Hour, and carries 100 marks. The weekly periods of a session subject, or session part of a subject, or tutorial part of a subject constitutes 1.50 Credit Hour, and carries 150 marks.

Examination in a theory course/theoretical part of a course consists of the following three parts.

1. Four quizzes are held and distributed evenly over the semester. The best three quiz results are considered, which carry 15 % of the total marks of the course.
2. Mid-Semester Examinations, usually around the middle of the semester on the portion of the syllabuses covered by then, carrying 25 % of the total marks in the subject.
3. Semester Final Examinations covering the entire syllabus and carrying 60 % of the total marks in the subject.

Final grade in the theoretical part of a course shall be on the basis of the total aggregate of marks secured by the student in the quizzes, the mid-semester, and the final semester examinations. A student missing any quiz or examination shall be considered to have received a zero for that quiz or examination.

The tutorial part of a course shall be assessed continuously throughout the semester in the form of quizzes, homework and library assignments. Marks will be also be earned in

theoretical or session courses.

The session, or session part of a course, shall be assessed continuously throughout the semester. In addition, a final examination may be given. If a student fails in any session or practical class, he will not be allowed to sit in the written Semester Final Examination. Final grades in all courses are recorded as letter grades on the basis of aggregate marks secured in the quizzes, the mid-semester, and the final examination. For any course a student must secure 45% or above of the total aggregate marks to pass the course. The following are the letter grades and their equivalent marks distribution and Grade Points.

Grade	Percentage Marks	Grade Point/Credit Hour
A+	80 and above	5.00
A	70 to below 80	4.00
B	60 to below 70	3.00
C	50 to below 60	2.00
D	45 to below 50	1.50
F	Below 45	0.0 (Failed)
S	Satisfactory	
U	Unsatisfactory	

Total grade points secured divided by the total credit hours taken shall be calculated as the Grade Point Average.

A student is declared to have passed the semester examinations of the M.Sc.TE programme when he passes in all the courses of the semester with a minimum GPA of 2.50. A student failing in not more than two theoretical courses may be allowed to sit for a Referred Examination to be held normally within two weeks from the commencement of the next semester. The Examinations will cover the entire syllabus of the course. Those failing in any session course will not be eligible for Semester Final or Examinations.

The award of the Post Graduate Diploma in Technical Education is classified as:

- First Class with Honours
- First Class
- Second Class

However, no class is awarded in the case of the Master's of Science in Technical Education. A student securing a Cumulative Grade Point Average (CGPA) of 4.25, and above, is placed in the First Class with Honours. Those securing CGPA of 3.00 and above are

placed in the First Class. Other successful candidates are placed in the Second Class.

### Course Structure of the Master of Science In the Technical Education Programme

Considering the varied roles of a technical and vocational education teacher/trainer, the curriculum framework includes courses to prepare the trainees in various aspects. This includes pedagogy, content-cum-methodology, Administration, Curriculum Development, Educational Planning, Educational Guidance and Counselling, and concept of Philosophy of technical and vocational education programme.

### Core Requirements

### POST-GRADUATE DIPLOMA IN TECHNICAL EDUCATION (PGDTE)

#### First Semester

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		<b>L-T-Lab</b>	
<sup>1</sup> ITS 0102	Spoken Arabic I	0 – 0 – 2	1.00
Or			
<sup>1</sup> ITS 0104	Spoken English I	0 – 0 – 2	1.00
Or			
<sup>1</sup> ITS 0106	Spoken French I	0 – 0 – 2	1.00
<sup>1</sup> ITS 0107	Islamiat	2 – 0 – 0	2.00
<sup>2</sup> ITS 4749	Science Technology and Islam	2 – 0 – 0	2.00
ITS 5103	Educational Psychology	3 – 0 – 0	3.00
ITS 5119	Administration and Supervision of Technical & Vocational Education.	3 – 0 – 0	3.00
ITS 5125	Advanced Methods & Techniques of Teaching	3 – 0 – 0	3.00
ITS 5126	Advanced Methods & Techniques of Teaching Lab	0 – 0 – 2	1.00
Technical Courses	Two technical courses from the respective specialization	6 – 0 – 4*	8.00*
	<b>Total L-T-Lab</b>	<b>19 – 0 – 8*</b>	
	<b>Total Hours</b>	<b>27*</b>	<b>23.00*</b>

- <sup>1</sup> There will be slight deviation for different specialization & groups having different backgrounds.
- <sup>1</sup> For those students who have done B.Sc. Engineering or B.Sc.TE outside of the IUT.
- <sup>2</sup> Only for IUT graduates.

## Second Semester

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		<b>L-T-Lab</b>	
<sup>1</sup> ITS 0202	Spoken Arabic II	0 – 0 – 2	1.00
Or			
<sup>1</sup> ITS 0204	Spoken English II	0 – 0 – 2	1.00
Or			
<sup>1</sup> ITS 0206	Spoken French II	0 – 0 – 2	1.00
<sup>1</sup> ITS 0207	Islamic History Science & Culture	3 – 0 – 0	3.00
ITS 5211	Philosophy of Education	2 – 0 – 0	2.00
ITS 5213	Curriculum Development in Technical & Vocational Education	3 – 0 – 0	3.00
ITS 5235	Educational Measurement & Evaluation	3 – 0 – 0	3.00
ITS 5253	Education Research	3 – 0 – 0	3.00
ITS 5258	Observation & Practice Teaching	0 – 1 – 3	2.00
Technical Courses	Two technical courses from the respective specialization	6 – 0 – 4*	8.00*
	<b>Total L-T-Lab</b>	<b>20 – 1 – 9*</b>	
	<b>Total Hours</b>	<b>30*</b>	<b>25.00*</b>

- <sup>1</sup> There will be slight deviation for different specialization & groups having different backgrounds.
- <sup>1</sup> For those students who have done B.Sc. Engineering or B.Sc.TE from out side IUT.
- <sup>2</sup> Only for IUT graduates.



## Core Requirements

# MASTER OF SCIENCE IN TECHNICAL EDUCATION (M.Sc.TE)

### First Semester

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		<b>L-T-Lab</b>	
ITS 6000	Thesis	0 – 0 – 12	6.00
ITS 6115	Curriculum Organization & Development	3 – 0 – 0	3.00
ITS 6157	Educational Planning	3 – 0 – 0	3.00
ITS 6159	Educational Research and Statistics	4 – 0 – 0	4.00
Technical Courses	One technical course from the respective specialization	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>13 – 0 – 12</b>	
	<b>Total Hours</b>	<b>25</b>	<b>19.00*</b>

### Second Semester

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		<b>L-T-Lab</b>	
ITS 6000	Thesis	0 – 0 – 15	7.50
ITS 6207	Educational Guidance & Counselling	3 – 0 – 0	3.00
ITS 6224	Seminar on Technical and Vocational Education for Development	0 – 3 – 0	1.50
ITS 6233	Systems Approach in Education	3 – 0 – 0	3.00
Technical Courses	One technical course from the respective specialization	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>9 – 0 – 15</b>	
	<b>Total Hours</b>	<b>24</b>	<b>18.00*</b>



**ITS 5211: Philosophy of Education** 2 – 0 – 0 Credit 2.00

Meaning and concept of philosophy; Key concepts, various philosophies: idealism, realism, pragmatism, and existentialism. Theories of Education: perennialism, essentialism, progressivism and re-constructivism, role of philosophy in education.

**ITS 5213: Curriculum Development in  
Technical and Vocational Education** 3 – 0 – 0 Credit 3.00

The meaning and concept of curriculum and its importance in education, foundations or determinants of curriculum; curriculum development process; content; methodology, evaluation; formulation of objectives; criteria and procedures of content selection; curriculum designs, curriculum implementation and instructional materials; curriculum evaluation; formative and summative evaluation; various models of curriculum evaluation.

**ITS 5235: Educational Measurement  
and Evaluation** 3 – 0 – 0 Credit 3.00

Evaluation of student progress; principles of measurement evaluation; scales of measurement; tests as measuring instruments; nature of psychological entities measured by tests; assessment of goodness of tests as measuring instruments; types of validity, reliability and usability of tests; tests as samples of behaviour; inferences involved in constructing and applying tests for measurement; planning the test specification of objectives in test construction plan; types of test items; item construction; item analysis- difficulty and discrimination indexes, interpretation of test scores, standardization and norms; measurement of abilities achievement, aptitudes, intelligence. Evaluating affective behaviours – evaluation methods based on observation, socio-metric and related techniques, self report inventories, protective techniques; testing programmes and problems in the OIC countries.

**ITS 5253: Educational Research** 3 – 0 – 0 Credit 3.00

Concept of educational research, need for research in technical education, Types of research, description and characteristics of different types of research; Research process – steps in conducting research, review of related studies and literature;

Variables, hypothesis, sampling, Selecting and defining a problem; Describing methodology of research; Data collection, analysis of data and its interpretation; use of descriptive statistics in interpreting data: Measures of central tendency dispersion and correlation. Preparing research proposals; Organizing/conducting research; Writing research reports; and evaluating research.

**ITS 5258: Observation and  
Practice Teaching**

**0 – 1 – 3 Credit 2.00**

Introduction to the practical role of a teacher: preparation for teaching a specialized subject.

## **MASTER OF SCIENCE IN TECHNICAL EDUCATION (M.Sc.TE)**

**ITS 6115: Curriculum Organization  
and Development**

**3 – 0 – 0 Credit 3.00**

Definition of curriculum, sources of curriculum; public curriculum and its control; subject-based and system-based development of curriculum; formulation and integration of curriculum; scope, sequence, continuity and integration of curriculum subject organization, broad fields, social processes and life functions, experience and core-curriculum; principles of curriculum development; national guidelines and government policy, need assessment for specific education, formulation of objectives, selection of content and learning experiences, identification of a teaching-learning strategy and identification of evaluation techniques; formative and summative evaluation and evaluation by consumer of education and its products.

**ITS 6157: Educational Planning**

**3 – 0 – 0 Credit 3.00**

Educational planning – definitions and terminology; different approaches to educational planning; the role of targets in educational planning; cost analysis in educational planning; the planning process; constraints on educational planning.

**ITS 6159: Educational Research  
and Statistics**

**4 – 0 – 0 Credit 4.00**

Methods of educational research; historical, descriptive, and experimental.

experimental design; qualitative research: need, characteristics, themes, methods and techniques; action research: planning, design, teacher as researcher, classroom research, sampling; testing experimental hypothesis, determination of sample size, tools of research, parametric tests, testing statistical significance; z – test, t – test, analysis of variance, nonparametric tests; 2 tails – test, median test. Use of statistical techniques in the behavioural sciences.

**ITS 6207: Educational Guidance  
and Counselling**

**3 – 0 – 0 Credit 3.00**

Definition, nature and scope of guidance; principles and basic concepts of guidance; importance of guidance and counselling in vocational and technical institutions; needs assessment for guidance; distributive and objective guidance and their components; relationship of guidance with curricular and extracurricular activities of the school; guidance and counselling tools and techniques tests, interest blanks, cumulative records, inventories, rating scales and case studies; guidance programme in school and its organization, management and administration; placement services; guidance personal and their responsibilities.

**ITS 6224: Seminar on Technical & Vocational  
Education for Development**

**0 – 3 – 0 Credit 1.50**

The role of technical and vocational education for social and economic developments; human resource development processes; problems of developing technical know-how in underdeveloped countries; trends and issues of vocational and technical education in OIC countries.

**ITS 6233: Systems Approach in Education**

**3 – 0 – 0 credit 3.00**

Definition of a system; the systems approach for assessment and improvement of operations; subsystems; organizations, and interdisciplinary studies; objectives and their choice; operations research in the study of systems; use of computers in systems analysis; decision models, matching problems of systems that include men and computers; quantifiable parameters of group performance, reliability as a parameter; evolutionary design of complex systems; relations between human engineering, operations research and systems engineering; application of the systems approach

for assessment, analysis, management and improvement of education systems.

ITS 6000: Thesis (Research Work) 0 – 0 – 12 Credit 6.00  
(1<sup>st</sup> Semester)

ITS 6000: To complete thesis 0 – 0 – 15 Credit 7.50  
(Research Work)  
(2<sup>nd</sup> Semester)

### Concentration Requirements

## POST GRADUATE DIPLOMA IN TECHNICAL EDUCATION (PGDTE)

**Specialization: Thermo-Fluid Engineering (16 Credit Hours)**

### First Semester

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		L-T-Lab	
MCE 5100	Special Studies	0 – 0 – 4	2.00
MCE 5103	Mechanical Behaviour of Engineering Materials	3 – 0 – 0	3.00
MCE 5111	Intermediate Fluid Mechanics	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>6 – 0 – 4</b>	
	<b>Total Hours</b>	<b>10</b>	<b>8.00</b>

## Second Semester

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		L-T-Lab	
MCE 5200	Special Studies	0 – 0 – 4	2.00
MCE 5209	Thermal Environmental Engineering	3 – 0 – 0	3.00
MCE 5213	Heat Transfer Equipment Design	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>6 – 0 – 4</b>	
	<b>Total Hours</b>	<b>10</b>	<b>8.00</b>

## Concentration Requirements

### Specialization: Production Engineering (16 Credit Hours)

#### First Semester

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		L-T-Lab	
MCE 5100	Special Studies	0 – 0 – 4	2.00
MCE 5121	Advanced Production Processes	3 – 0 – 0	3.00
MCE 5127	Advanced Machine Tools	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>6 – 0 – 4</b>	
	<b>Total Hours</b>	<b>10</b>	<b>8.00</b>

## Second Semester

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		L-T-Lab	
MCE 5200	Special Studies	0 – 0 – 4	2.00
MCE 5221	Plastics Process Engineering	3 – 0 – 0	3.00
MCE 5231	Designing for Production	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>6 – 0 – 4</b>	
	<b>Total Hours</b>	<b>10</b>	<b>8.00</b>

## Concentration Requirements

### POST GRADUATE DIPLOMA IN TECHNICAL EDUCATION (PGDTE)

**Specialization: Electrical Engineering (16 Credit Hours)**

## First Semester

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		L-T-Lab	
EEE 5100	Special Studies	0 – 0 – 4	2.00
EEE 5101	Analysis & Synthesis of Circuits	3 – 0 – 0	3.00
EEE 5103	Electric & Magnetic Properties of Materials	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>6 – 0 – 4</b>	
	<b>Total Hours</b>	<b>10</b>	<b>8.00</b>



## Second Semester

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		<b>L-T-Lab</b>	
EEE 5200	Special Studies	0 – 0 – 4	2.00
EEE 5201	High Voltage Engineering	3 – 0 – 0	3.00
EEE 5203	Power System Stability	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>6 – 0 – 4</b>	
	<b>Total Hours</b>	<b>10</b>	<b>8.00</b>

## Concentration Requirements

Specialization: Electronic Engineering (16 Credit Hours)

## First Semester

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		<b>L-T-Lab</b>	
EEE 5100	Special Studies	0 – 0 – 4	2.00
EEE 5101	Analysis & Synthesis of Circuits	3 – 0 – 0	3.00
EEE 5103	Electric & Magnetic Properties of Materials	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>6 – 0 – 4</b>	
	<b>Total Hours</b>	<b>10</b>	<b>8.00</b>

## Second Semester

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		<b>L-T-Lab</b>	
EEE 5200	Special Studies	0 – 0 – 4	2.00
EEE 5205	Advanced Electronics	3 – 0 – 0	3.00
EEE 5203	Microwave Engineering	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>6 – 0 – 4</b>	
	<b>Total Hours</b>	<b>10</b>	<b>8.00</b>

Concentration Requirements

## MASTER OF SCIENCE IN TECHNICAL EDUCATION (M.Sc.TE)

### Specialization: Thermo–Fluid Engineering (6 Credit Hours)

First Semester

\* Any one of the following

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		<b>L-T-Lab</b>	
MCE 6101	Numerical Analysis	3 – 0 – 0	3.00
MCE 6113	Advanced Heat Transfer	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>3 – 0 – 0</b>	
	<b>Total Hours</b>	<b>3</b>	<b>3.00</b>

Second Semester

\* Any one of the following

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		<b>L-T-Lab</b>	
MCE 6203	Applied Elasticity	3 – 0 – 0	3.00
MCE 6205	Classical Thermodynamics	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>3 – 0 – 0</b>	
	<b>Total Hours</b>	<b>3</b>	<b>3.00</b>

Concentration Requirements

Specialization: Production Engineering (6 Credit Hours)

First Semester

\* Any one of the following

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		<b>L-T-Lab</b>	
MCE 6131	Quality Assurance	3 – 0 – 0	3.00
MCE 6141	Operations Research	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>3 – 0 – 0</b>	
	<b>Total Hours</b>	<b>3</b>	<b>3.00</b>

Second Semester

\* Any one of the following

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		L-T-Lab	
MCE 6227	Production Management	3 – 0 – 0	3.00
MCE 6243	Engineering Economics	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>3 – 0 – 0</b>	
	<b>Total Hours</b>	<b>3</b>	<b>3.00</b>

Core Requirements

MASTER OF SCIENCE IN TECHNICAL EDUCATION (M.Sc.TE)

Specialization: Electrical Engineering (6 Credit Hours)

First Semester

\* Any one of the following

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		L-T-Lab	
EEE 6101	Engineering Analysis	3 – 0 – 0	3.00
EEE 6103	Energy Conversion	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>3 – 0 – 0</b>	
	<b>Total Hours</b>	<b>3</b>	<b>3.00</b>

Second Semester

\* Any one of the following

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		<b>L-T-Lab</b>	
EEE 6201	Advanced Machine Design	3 – 0 – 0	3.00
EEE 6203	Generalised Machine Theory	3 – 0 – 0	3.00
EEE 6205	Optimisation of Power System Operation	3 – 0 – 0	3.00
EEE 6207	Computer-Aided Power System Design	3 – 0 – 0	3.00
EEE 6209	Transient in Power System	3 – 0 – 0	3.00
EEE 6211	Modern Control Theory	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>3 – 0 – 0</b>	
	<b>Total Hours</b>	<b>3</b>	<b>3.00</b>

Core Requirements

Specialization: Electronic Engineering (6 Credit Hours)

First Semester

\* Any one of the following

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Credit Hours	Contact Hours
		<b>L-T-Lab</b>	
EEE 6101	Engineering Analysis	3 – 0 – 0	3.00
EEE 6103	Energy Conversion	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>3 – 0 – 0</b>	
	<b>Total Hours</b>	<b>3</b>	<b>3.00</b>

Second Semester

\* Any one of the following

L = Lecture

T = Tutorial

Lab = Laboratory/Workshop

Course Number	Course Title	Contact Hours	Credit Hours
		<b>L-T-Lab</b>	
EEE 6213	Applied Electromagnetic Theory	3 – 0 – 0	3.00
EEE 6215	Microwave Theory & Technique	3 – 0 – 0	3.00
EEE 6217	Statistical Theory of Communication	3 – 0 – 0	3.00
EEE 6219	Telephone Traffic Theory	3 – 0 – 0	3.00
EEE 6221	Digital Computer & Microprocessor Theory Design	3 – 0 – 0	3.00
EEE 6225	Laser Theory & Optical Communication	3 – 0 – 0	3.00
EEE 6227	Solid State Design	3 – 0 – 0	3.00
	<b>Total L-T-Lab</b>	<b>3 – 0 – 0</b>	
	<b>Total Hours</b>	<b>3</b>	<b>3.00</b>

Since the inception of the Institute's programmes in 1986, a total of 98 graduates from different OIC member countries have obtained the Degree of Master of Science in Technical Education from IUT as shown in Table 1.1

Table 1.1 Statistics Regarding Teacher Training in Technical and Vocational Education and Training in IUT

Course	Years																	Total
	1987	88	89	90	91	92	93	94	95	96	97	98	99	2000	01	02	03	
CVE	-	8	3	17	-	-	6	9	-	-	-	-	-	-	-	-	-	43
DVE	-	-	-	19	-	-	10	7	14	14	-	-	-	-	-	-	-	64
DTE	-	14	9	17	8	7	14	10	22	10	19	-	-	-	18	15	-	173
B.Sc.TE	-	-	-	-	13	7	16	8	18	17	27	31	19	14	20	17	19	267
PGDTE	9	18	13	15	-	8	9	8	11	10	7	21	13	9	10	9	10	191
M.Sc.TE	-	-	2	1	1	-	-	-	-	14	10	15	13	7	8	6	6	98
<b>Total</b>	<b>9</b>	<b>40</b>	<b>27</b>	<b>69</b>	<b>22</b>	<b>22</b>	<b>55</b>	<b>42</b>	<b>65</b>	<b>65</b>	<b>63</b>	<b>67</b>	<b>45</b>	<b>30</b>	<b>56</b>	<b>47</b>	<b>35</b>	<b>836</b>

As seen in Table 1.1 above, a total of 836 teachers of TVET have so far been trained and awarded certificates, diplomas, and degrees from various teacher education programmes in TVET from IUT. The table also shows that, some of the programmes are not run on a regular basis and further, nominations are not constantly made for the training of TVET teachers.

## INTERNATIONAL COOPERATION

IUT has signed the Memorandum of Understanding (MOU) with some Universities in Canada, America, Germany, and Ireland and is interested in further collaboration and cooperation with other interested universities all over the world.

It is important to evaluate the Master of Science in Technical Education programme of IUT in order to determine its strengths and weaknesses as compared to other international Master programmes in Teacher Education in TVET. Also, it is important to improve the quality of IUT Master of Science in Technical Education programmes through the dissemination of the new UNESCO International Master framework. Cultural identities must conform to student's expectations and experiences when setting forth a teacher certification process.

## CONCLUSION

Although considerable importance has been attached to the training of technicians, technologists, and engineers by member countries of OIC, little has been done for the improvement of teachers and their training programmes. Also, little has been done to increase the number of skilled persons who are responsible for training technicians in our Polytechnic Institutes/Technical colleges, Higher Technical colleges, and Vocational Institutes and Training centres.

An evaluation of the Teacher Education programmes in TVET of IUT, especially the Master of Science in Technical Education programme, should also take cultural issues into consideration.

OIC member states should nominate more candidates to be trained as teachers of TVET in IUT, and some incentives should be offered in order to encourage their participation in these programmes. IUT should also create more seats for admission into

teacher education programmes in TVET, knowing the important role these teachers play in the training and development of technicians in the member countries.

If IUT could cooperate with more universities around the world, it would allow students and faculty members to be exposed to a wider variety of programmes and practices, which is important in today's globalized world.

## Appendix

### List of OIC Member States

- |                      |                 |                          |
|----------------------|-----------------|--------------------------|
| 1. Afghanistan       | 20. Ivory Coast | 39. Pakistan             |
| 2. Albania           | 21. Indonesia   | 40. Palestine            |
| 3. Algeria           | 22. Iran        | 41. Qatar                |
| 4. Azerbaijan        | 23. Iraq        | 42. Saudi Arabia         |
| 5. Bahrain           | 24. Jordan      | 43. Senegal              |
| 6. Bangladesh        | 25. Kazakhstan  | 44. Sierra Leone         |
| 7. Benin             | 26. Kuwait      | 45. Somalia              |
| 8. Brunei Darussalam | 27. Kyrgyzstan  | 46. Sudan                |
| 9. Burkina Faso      | 28. Lebanon     | 47. Suriname             |
| 10. Cameroon         | 29. Libya       | 48. Syria                |
| 11. Chad             | 30. Malaysia    | 49. Tajikistan           |
| 12. Comoros          | 31. Maldives    | 50. Togo                 |
| 13. Djibouti         | 32. Mali        | 51. Tunisia              |
| 14. Egypt            | 33. Morocco     | 52. Turkey               |
| 15. Gabon            | 34. Mauritania  | 53. Turkmenistan         |
| 16. Gambia           | 35. Mozambique  | 54. Uganda               |
| 17. Guinea           | 36. Niger       | 55. United Arab Emirates |
| 18. Guinea Bissau    | 37. Nigeria     | 56. Uzbekistan           |
| 19. Guyana           | 38. Oman        | 57. Yemen.               |



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# Problems and Perspectives of Master's Degree Programmes for In-service TVET Teachers: A Case Study at Tongji University

## Background

As an education programme closely related to the economy and society, vocational education is achieving greater prominence in China. An increasing number of people are acknowledging that a high-quality TVET teaching force is the key to reform and development of vocational education. The Chinese government has taken action to improve the quality of the teaching staff of secondary vocational education in recent years. It is the goal that teachers and principals in secondary vocational schools have a Masters degree. In 2001, thirteen universities were allowed to offer on-the-job study courses for a Master's degree to outstanding young teachers in secondary vocational schools. In 2003, another nine universities were allowed to offer this kind of programme. In 2004, this policy was also adopted for in-service education of teachers in vocational colleges and universities. By the end of 2005, there were twenty two universities that offered in-service degree education to TVET teaching staff in seventeen master disciplines in China.

In this paper, the education programme at the Institute of Vocational Instructors at Tongji University is analyzed as an example of the Master's level TVET in China. After discussing the characteristics and analyzing the problems, suggestions are proposed to improve this programme for in-service TVET teachers.

## The Background of Master's Education for TVET Teachers in China

### The Reform of Vocational Education

A higher quality of vocational education is necessary in order to supply a high quality labour force. The quality of vocational education greatly depends on the quality of its teaching force. However, the quality of TVET teachers in China cannot, at

present, meet the current demands of the comprehensive expansion of education due to reforms in the economy and society. With the change of the economic structure and the expansion of the economy, a qualified labour force is needed in the highly competitive labour market in industry and services. There still exist many problems for TVET teachers in China, i.e. low levels of academic qualification, weak practical skills, and a deficit of scientific research experience. TVET teachers need to be trained for a broader range of possibilities and greater ability in research. This could be achieved through a Master education programme.

### **The Development of Secondary Vocational Education**

Table 1 below, shows the total number of enrolled students, faculty, and full-time teachers in the secondary vocational and technical schools in China. It is evident in recent years that although the number of students in secondary vocational and technical schools has not fluctuated significantly, the number of teachers is dropping steadily every year. In early 2005, the Ministry of Education explicitly proposed that the number of enrolled students should be increased by one million, bringing it to 6.5 million in total, a bigger increase than that of 2004. In 2007, the number of enrolled students in TVET is expected to reach the same level as that in higher education institutes. For this reason, a larger quantity of TVET teachers is needed. In order to ensure teaching quality after expansion of the student enrolment, the quality of teaching staff must also be ensured. Towards this end, a higher level education for TVET teachers is needed. The education level of teachers could be improved in two ways. One, is the requirement that new teachers be required to have at least a post-graduate education background (i.e. a Master's degree), and the second is that in-service teachers with a Bachelor degree should be encouraged to accept continuing professional development for higher degrees. In this regard the Master's programme for TVET teachers can be seen as a key element in meeting the needs of secondary vocational education development.

Table 1 Students and Teachers in Secondary Vocational Schools in China

Year	Students	Faculty	Full-time teachers
2000	4,895,000	488,000	256,000
2001	4,580,000	429,000	230,000
2002	4,564,000	382,000	208,000
2003	5,024,000	347,000	199,000

### **The Development of Higher Vocational Education**

An important factor in the recent development of higher education in China has been the exponential development of enrolment which has expanded year on year since 1999. In 2004, 4.4734 million university students were enrolled, with 2.0992 million registered for a bachelor's degree, and 2.3743 million in high vocational colleges registered for programmes which do not carry a degree award. That is to say, more than half the students registered at university receive high vocational education in China. Considering the difference in the training goals for high vocational education and ordinary graduate education, there must be differences between the teachers. For a vocational teacher, the teaching ability, especially practical-training ability, is important. In terms of research, engineering, or theoretical research, ability is important for university teachers, but for vocational teachers, didactical research ability is much more important. Many vocational colleges have been upgraded from secondary vocational schools in China and now enjoy higher status as Vocational Colleges. It is urgent to enhance the didactic training level of teachers through a Master's education programme.

### **Lifelong Study for TVET Teachers**

Living in the age of a 'high-tech' economy, lifelong study has become even more important than ever. It is believed that only with lifelong study abilities, can one win in such a competitive society. With the popularization of multimedia tools, network information technology in schools, and the adoption of new materials, new techniques, and new methods, a vocational school teacher must be constantly kept abreast of the latest developments. The developing TVET master's programme aims to meet with the needs of lifelong study for teachers.

## **Problems in Master Education for TVET Teachers in China**

### **Different Backgrounds of In-Service Teachers**

Vocational schools have a particular focus. Vocational teachers have strong specialized knowledge and practical expertise. However, they usually know little about basic theory in education, such as pedagogy, psychology, didactics, educational technique, etc. Directors of different vocational schools have different views of professional development for their teachers. Most teachers are required to spend a lot of time on their daily teaching plan at school, and they simply do not have enough time for thesis work.

### **More Theoretical Lessons and Little Practical Training**

Usually the Master's programme pays too much attention to theoretical study while the practical side is neglected. Currently, in China, the graduate schools use a credit system. Generally the total number of credits should be over 34 credits, and only 1-2 of them are dedicated to practical training. Furthermore, there is no specific programme for practical elements of the programme. Although every student can participate in teaching practice or with the help of a tutor, there is still no clear consensus on the content and duration of these practical elements.

### **The Subject of the Thesis Focusing on Engineering**

The goal of Master education for TVET teachers is mainly to improve the teachers' knowledge, skill level, and research ability which is necessary for their profession. However, some master candidates will study in highly specialised fields, for example, the degree of Master of Engineering, whereby their dissertation will be evaluated by a degree assessment committee in engineering, then they will work on their dissertation in the field of engineering and not in the broader context of vocational education. In such fields of enquiry the dissertation element cannot then reflect the interdisciplinary intent of the curricula.

### **Teachers Moving to other Employment Fields**

Because of the differences in economic development in East and West China, many teachers leave the vocational schools in which they have worked for years, and find other positions in companies in other developed cities. For example, all the TVET teachers from Inner Mongolia have found jobs in Shanghai or its peripheral region, 40% of TVET teachers from Xinjiang area also found jobs in Shanghai, simply because the economic development in eastern China areas such as Jiangsu, Zhejiang, and Shanghai is better. Teachers from middle and western China, especially from Qinghai, Inner Mongolia, and Xinjiang areas cannot resist the lure of a better environment, better working conditions, and higher salaries in the east. They do not want to return to the vocational schools they used to work in. Now they are engaged in occupations concerning information technology, consultation, structural design, etc.

## Introduction of the Master's Programme for TVET Teachers in Tongji University

### Basic Information

The Institute of Vocational Instructors at Tongji University was founded in 1994. It is one of the officially recognized centres for continuing education of teachers of secondary and higher vocational education in the People's Republic of China. It is also a Sino-German joint training centre for vocational teachers. In 2001, the Institute was allowed to offer a Master's education in pedagogy. In the same year, the Institute was also allowed to offer a Master's programme to in-service TVET teachers. The Institute offers two kinds of Master's degree to in-service TVET teachers. One is Master of Pedagogy; the other a Master of Engineering with three research majors: civil, mechanical, and electronic. So far, there are 225 in-service teachers enrolled as Master candidates in the Institute as shown in Table 2.

Table 2 In-Service Teachers as Masters Candidates at Tongji University

Degree	Major	Master candidate
Master of Engineering	Civil Engineering	50
	Mechanical Engineering	86
	Electronic Engineering	71
Master of Pedagogy	Pedagogy	18
Total		225

### Duration of Study

The length of study for the work based master's programmes is three years. Here one and a half years for course study, and one and a half to two years for dissertation work is the norm. If all requirements have been fulfilled, and if officially approved, a student may graduate ahead of schedule. The entire study time should be no less than two years, and no more than four years.

## Curricula

The TVET masters' curricula consists of both an in-class, and a practical component. The courses consist of required and optional courses. As for the three specialities with an engineering background, the compulsory courses are both in Vocational Pedagogy and in Engineering, as is shown in Fig. 1.

Compulsory Course in engineering	Optional Course in engineering	Practical part
Compulsory Course in pedagogy	Optional Course in pedagogy	
Public and basic course		

Fig. 1 Curricula Structure

In Tongji University, a graduate student must earn no less than 34 points. To be exact, compulsory courses consist of over 18 credits, optional courses over 11 credits, and practical at least 5 credits. Table 3 shows a sample curriculum for a major in Pedagogy.

Table 3 Curricula for Major of Pedagogy

Courses		Study hour	Credit Point
Public and Basic Courses	Selected Marxist Classic Works	54	2
	Theory and Practice of Socialism	36	1
	First Foreign Language (basic course)	180	3
Compulsory Courses	First Foreign Language (specialized course)	36	2
	Educational Research Methods	54	3
	Outlines of TVET Curricula	54	3
	Development of Modern Teaching Media	36	2
	Vocational Pedagogy	54	3
	Comparison of TVET in China and Germany	54	3

Optional Courses	Second Foreign Language	108	2
	Foundations of Computer Network Technology	36	2
	Psychology on TVET	54	3
	Comparison of International Vocational Education	36	2
	Educational Technology and Teaching Methods	36	2
	Development and Management of Human Resources	36	2
	Outlines of Scientific Research Methods	36	2
	Ergonomics	36	2
	Management on TVET	36	2
	Development of Career	36	2
	Vocational Education Development and Policy Research	36	2
Practical element	Gymnastic Exercises	18	1
	Research Background and Literature Analysis and the Formulation of Research Plan		1
	Attendance at at least four seminars		1
	Practice as Teaching Assistant and Engineering Research Assistant		2

### Dissertation Work

The research dissertation should be completed independently, under the guidance of the tutor. All the work should include a report on why the subject was selected, the scheme of dissertation work, the examination and comment procedures of paper, and a revision of the paper.

## The Features of Master Education at Tongji University

### A Comprehensive Team of Tutors

There are eight Master tutors at the Institute of Vocational Instructors of Tongji University, seven of them have a doctoral degree, and most of them have an engineering background. The tutors are experts both in engineering and in pedagogy.

With the support of the joint Sino-German project, all teachers in the institute have

the opportunity to study vocational and technical education in Germany. Through Sino-German cooperation, which is organized as a "sandwich program", these teachers obtained doctoral degrees in Germany in Vocational Pedagogy.

Others are part-time tutors from RIBB-Shanghai (Regional Institute of Vocational Education, Shanghai), or ZIBB-China (National Vocational Education Research Centre, China). As experts, they have the in-depth knowledge of vocational and technical education in Shanghai, China, and other parts of the world. They are able to bring students the latest trends in developments in vocational education.

Some other tutors have been introduced from the engineering colleges of Tongji University, such as the School of Civil Engineering, the School of Electronic Engineering, and the School of Mechanical Engineering. They are experts in engineering for the latest technology.

#### **A Series of Compound Vocational Courses**

Tongji University is famous for its engineering programme, especially in Civil Engineering. In addition to courses in engineering, a number of compound vocational courses are also developed. These special courses include the Development of Career, Didactics in Engineering Education, Development of Modern Teaching Medias, and so on.

#### **A Set of Open and Integrated Laboratories**

On the basis of advanced teaching equipment, several practice-oriented laboratories have been established to enhance students' practical skills. The flexible manufacture processing system (MSM) was introduced from the German SL Company. The automated system (AUTS), which is a set of training equipment that replicates actual production processes, was set up by the German FESTO Company. This electrical technology has obtained very good results when integrated into teaching contexts. As an example of this the Anchorage Technology Training Laboratory was established by the Fisher Group in the field of civil engineering.

#### **Broad Cooperation with the Outside World**

Based on the Sino-German joint project, the Institute devotes a lot of attention to cooperation with educational administration departments, cooperation with local vocational secondary schools and vocational colleges, as well as cooperation with Chinese and foreign research institutes. The frequent international exchanges give students the opportunity to study in Germany or Japan for up to one year. There are



also chances for in-service teachers to participate in domestic and international academic conferences which enable them to catch up with current vocational patterns, ideas, training goals, and development trends of the future in various countries.

## Suggestions to Improve Master's Education for TVET Teachers

### Co-operation among Universities

Considering the different backgrounds of master's students, it is necessary to set up co-operative efforts with other institutes and universities, creating conditions to implement cross-discipline, cross-space training programs. These programmes would give students opportunities to select specialized optional courses to meet their own interests. It is also a good way to share the resources and experiences of other institutes or universities.

### Establishing a New System to Strengthen Operation Training

The goal of vocational education training is to bring up a new generation which has knowledge both in culture and technique, as well as skills in operation and ability in management. Qualified TVET teachers, in addition to teaching students, are required to be equipped with these qualities. According to the characteristics of professional, practical, and vocational requirements for a master candidate in TVET, it is proposed to establish a „two schools, one company“ training model, as shown in Table 4.

Table 4 Training Model for Master's Programmes of TVET Teacher

Study Place	University	Company	Vocational school
Identity	Student	Employee	Teacher
Content	Theory	Professional Practice	Didactical Practice
Trainer	Professor	Engineer	Teacher
Time	First and second semester	Third and/or fourth semester	Fourth and/or fifth semester

### Set a Special Master's Degree Certificate for TVET teachers

It is necessary to set up a master's degree certificate especially for TVET teachers. This new major should be established in engineering universities instead of normal

universities. Master's candidates should have courses both in Vocational Pedagogy and in Engineering Technology. After acquiring the necessary knowledge and skills, they would be able to integrate them into their teaching programs. The final dissertation should be engaged in research in special didactics, with an engineering background or vocational trade. In this way, the teachers will be able to teach in industrial trade or service fields, as well as in vocational education.

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Frank Bünning, Otto-von-Guericke-University, Germany

## Case Study: Example of Internationalisation through Development of a Master's Degree Dual Award between Anglia Ruskin University, UK and Otto-von-Guericke-University, Magdeburg, Germany

### Internationalisation of Higher Education

In an increasingly globalised world internationalisation is high on the agendas of national governments and institutions of higher education. European programmes such as ERASMUS and the development of networks of co-operation between Universities are just two examples of how the international dimension has become an important force within higher education over the past decade.

When Examining the definition of the term "internationalisation" a number of different conceptions need to be taken into account and discussed. It is beyond the scope of this paper to analyse the many different definitions, terms and approaches to the topic. However, it can probably be agreed that "Internationalisation of higher education is the process of integrating an international/intercultural dimension into the teaching, research and services functions of the institutions" (Knight and de Wit 1997: 8).

The growing internationalisation of higher education is a most significant development with far reaching impacts on teaching and research. It has moved from the margins to the centre of concern. It would appear to be safe to state that internationalisation is perceived as an impulse for the further development of higher education. International interaction, sharing expertise, academic networking and enriched curricula are some of the benefits that are referred to when discussing the advantages of internationalisation in higher education. As there are always two sides to every coin, the negative sides of internationalisation are also the subject of lively and controversial discussion.

For instance, the issue of funding may undermine the notion of higher education as a 'public good'. Internationalisation may strengthen competition and, consequently, reduce co-operation among countries and institutions. The promotion of cultural diversity could be subject to erosion by an expansion of a world language and dominant western cultures. Furthermore, the brain drain may increase as an international academic labour market evolves (IAU 2003). In addition, Badley (2004) alerts us to the dangers of what he terms 'intellectual imperialism' where he asserts 'we (i.e. those who hold Western European or North American educational and cultural values) boldly export our academic products, avowed principles, and operational processes irrespective of their western origins, to students abroad, carrying with us an undercurrent of the cult of the individual, personal empowerment and certification, and competitive striving. However, these minor educational subtexts may grow to catastrophic proportions in exotic environments' (Johnston 1999). Notwithstanding these important caveats, it appears that in a globalised environment, internationalisation of education is no longer an option. No system or institution is immune from the impact of internationalisation and no institution can remain cut-off from international networks, "we can increasingly speak of an international higher education sector or a global higher education community" (IAU 2003: 21).

The initial concept was of a joint Master of Science programme (MSc) which would be developed between the British and German universities, but would also involve three Baltic state partners. The course is entitled 'International Vocational Education' and leads to a dual award. This means that students who successfully complete the programme would be awarded a Master's degree certificate from each participating university involved.

The project's initial aim was international recognition of a Masters' level qualification for vocational education and training experts. In the Master's programme, the student should learn professional operational and innovative strategies.

In the context of EU enlargement, the project involves three new EU member states: Latvia, Estonia and Lithuania, which faced a high regional demand for a sound interdisciplinary academic qualification in the field of vocational education and training. The new eastern EU are undergoing drastic changes within their vocational education and training systems. Since regaining their sovereignty, the Baltic states – which joined the EU in May 2004 – have made enormous efforts to re-orient

their national vocational education and training systems. The development of these new systems has been considerably oriented towards European standards in order to create transparent structures, following EU guidelines.

The development of national vocational education and training systems in the Baltic states is confronted by several problems. Among others, initial and continuous (in-service) vocational education and training of specialised personnel is still considered difficult and problematic. The main reason is that these countries lack appropriately developed structures for their vocational education and training systems because of historic factors, mainly the result of years of economic neglect. The lack of professionally trained personnel in public and private training institutions is also significant.

On the basis of the above mentioned factors, as well as with regard to the further development of European vocational education and training, the necessity arose to introduce a course for the initial and in-service training of specialised personnel involved in vocational education and training. For some years the modularisation of courses and the introduction of graduated degrees according to Anglo-American models, aimed at improving the attractiveness of courses, had been discussed at the political level. As the universities in Great Britain (Anglia Ruskin University) and Germany (Otto-von-Guericke-University) have gained experience in similar projects, these countries were given specific tasks for this degree development.

The Department of Vocational Education and Human Resource Development at Otto-von-Guericke-University Magdeburg, in co-operation with the School of Education at Anglia Ruskin University (Chelmsford/Cambridge), intended to deliver the international course of studies leading to the professionally qualifying degree "Master of Science in International Vocational Education." This is in line with the Baltic States' needs and should achieve the overall objective of strengthening these European higher educational institutes' competitiveness in an international context, as well as helping the further development of European economic structures in that promising area. It is believed to be the case that in view of growing national and international competition, commitment in this sector is urgently needed.

It is believed that this collaborative M.Sc. programme makes a significant contribution to expanding vocational education and training structures and to supporting economic development in the Baltic states of Latvia, Lithuania, and Estonia.

The course's internationalisation and the intended contributions of guest lecturers from the countries involved in the project are, among others, new approaches to teaching and contribute to a further enhancement of the international dimension of vocational education and training. The target development of experts in the field of initial and in-service training serves as the foundation for the further development of personnel. Furthermore, by carrying out the project, it is the intention to strengthen these European higher educational institutes' competitiveness in an international context, as well as to help further develop European economic structures in that promising area. Through this collaborative M.Sc. programme, the project should make a significant contribution to expanding vocational education and training structures and to support economic development in the Baltic states.

## Proposed Course Structure

Admission to the Master's programme is dependent upon successful completion of professionally qualifying studies. This would normally be an undergraduate degree in an appropriate discipline. The programme, which is full-time, is designed to last four semesters, and a total of 120 ECTS are awarded. The curriculum is structured according to modular principles and is bilingual (English and German), which contributes to the students' internationally oriented training. Bilingual teaching plays a crucial role especially for the Baltic states as new members of the EU. In addition to teaching being carried out by experts from all partner countries, students will have the opportunity of spending a part of their studies in different countries. In this way, the international dimension can be integrated into the curriculum.

It is believed that these innovations would have a considerable effect on the courses' attractiveness and support the further development of the international profile, consequently contributing to a higher quality programme.

## Preparation Semester

The prospective students attend language courses (German and English), and they finish with a final examination.

This preparation includes successful participation in the examination procedures of

TestDaF (German as a Foreign Language) level 4 and TOEFL 550/213 scores.

## Summer School

This is intended to involve preparation of the Baltic state students in terms of technical and professional skills and knowledge, in addition to language knowledge and skills at Otto-von-Guericke-University, Magdeburg, until appropriate structures can be established at the Baltic states partner institutes themselves.

## First and Second Semester

The programme consists of study at the Otto-von-Guericke-University, Magdeburg, and internships in vocational educational institutes in Germany, or organisations of developmental co-operation such as Inwent. The modules of study are as follows:

Theories of Vocational Education	9 ECTS
Foundations of In-Company Training & Vocational Didactics 1	9 ECTS
International Management	9 ECTS

### Option Modules (2 out of 6)

Foundations of Sociological Research Methodology	9 ECTS
Organisation Development and Organisational Learning	9 ECTS
Planning of Education Processes and Knowledge Management	9 ECTS
Systems of Quality Management and Quality Assurance	9 ECTS
Methodology of In-Company Vocational Training & Education	9 ECTS
Foundations of In-Company Training & Vocational Didactics 2	9 ECTS

Total	18 ECTS
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Internship in Initial & Continuing Vocational Education Providers	16 ECTS
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## Third Semester

Studies at Anglia Ruskin University Chelmsford/Cambridge.

Modules of study:

Social Diversity in Further Education

15 ECTS

The Changing Policy Context of Further Education

15 ECTS

E Learning Technologies

15 ECTS

## Fourth Semester

Research for a Master's thesis either at Otto-von-Guericke-University, Magdeburg  
or Anglia Ruskin University, Chelmsford/Cambridge

20 ECTS

## Further Developments

A particular strength of modular programmes is that normally, although not always, one of the primary organising principles is that they are outcome, not content driven. This means that curriculum proposals are written primarily in terms of the outcomes of the learning process, not the study of the content through which the outcomes are achieved. This does not denigrate the importance of content but instead facilitates flexibility since it is possible for the same learning outcomes to be achieved by following various paths of study. Outcome-driven models also increase flexibility because students may study in a variety of different contexts whilst still achieving similar learning outcomes. This is particularly important in international contexts where an emphasis upon content may lead to different interpretations which could create barriers to international study.

The development of the Dual Award is a result of the modular structure, and especially the concepts of credit, accumulation, and transfer. Modules have outcomes, written in terms of the expected achievements of the students in relation to their learning in the programme. They normally include some indication of the content which students cover, guided by their professors, and a specification of assessment through which student-achievement is measured. Upon successful completion of assessment the student is awarded the corresponding credit.



Depending upon the particular national system involved, credit may be awarded not only for the achievement of assessed tasks, but also for the amount of time spent in study. There are sound pedagogic reasons for this, the most important being that not everything a student is expected to learn in a course of study should be measured – despite Thorndikes' dictum that "if something exists, it exists in some quantity and can be measured" (Beniafield 1996:75) – the important issue is whether it 'ought' to be measured – and thus formally assessed. Time spent in the process of learning is therefore acknowledged in addition to formally assigned tasks since there is a reasonable assumption that some valuable learning is likely to take place even if no formal assessment accompanies this learning. It is also an acknowledgement of the reality that outcome specification is an imprecise activity and awarding credit based only on assessment can lead to an over-assessment and 'shallow' rather than a 'deep' learning (Marton & Saljo 1976). A variation of this approach is utilised in the European Credit Transfer System which allocates specific credit points for so many hours of study (i.e. one ECTS point is equivalent to 30 study hours – both direct and indirect), and in the USA, where there is the concept of the 'credit hour'.

Whatever system is utilised, students accumulate credit towards an award. In some countries, like the UK, it is possible for students to be awarded certificates of credit which attest to the amount of credit which they have accumulated whilst studying even if they do not achieve all the credit required for a specified award. It is then theoretically possible for them to transfer this credit onto another course of study, subject to specific institutional procedures and quality assurance arrangements, possibly in the same institution or others operating similar transfer opportunities. The same principles underlie the transference of credits between institutions.

In respect to the Dual Award being considered in this paper, these principles have been enacted in the following ways. Students carry out the first 6 modules of study, plus the internship at Magdeburg during the first two semesters. This is equivalent to 61 ECTS points. When they come to Anglia, they enter the Master of Arts programme in Learning and Teaching with 60 credits through a credit recognition procedure. They then study two modules in the first semester, followed by a third module after semester one which is studied through a 'blended learning procedure'. This involves initial face-to-face teaching followed by web-based learning, and additional tutorials by Anglia Ruskin University's staff in Magdeburg.

It may be of interest to readers to know that the follow-up tutorials are carried out under the auspices of the Socrates Teacher Exchange Scheme, whereby teachers in higher education institutions carry out short periods of teaching in partner institutions in other EU countries, partly funded by Brussels.

Students must submit a dissertation either in Magdeburg or Chelmsford in order to complete the Dual Award. There is mutual recognition of dissertations by the two universities for the purpose of the dual award. Students who successfully complete all the modules at the required standard are awarded both the Master of Science in International Vocational Education from Magdeburg University, and the Master of Arts in Learning & Teaching from Anglia Ruskin University.

## **Comparisons between the Curriculum Structure of the Dual Award and the UNESCO International Master Framework**

This part of the paper will attempt to map the structure of the Dual Award in comparison to the International Framework Curriculum which was produced as part of the UNESCO meeting on Innovation and Excellence in TVET Teacher Education held between 8 - 10 November, 2004 in Hangzhou, China. The result was the Hangzhou Declaration (UNEVOC 2005).

Below are some general comments on the framework, which are first impressions and not informed by consideration of the views of any wider group of critics, although the authors are aware that there will be/have been sector conferences to discuss the framework. They are intended as exploratory in nature, specifically related to this particular dual award.

Although the proposed framework leads to a degree award of between 90 and 120 credit points, it is divided up into four separate sections:

Section 1 - Studies of Education, TVET and Vocational Disciplines

Section 2 - Studies of the Vocational Discipline and its Didactics

Section 3 - Further Studies

Section 4 - Thesis Work, and

Section 5 - Practical Studies.

Sections 1 & 2 are further divided into Foundation Studies and Advanced Studies.

In addition to the International Framework Curriculum, there are twelve Vocational Discipline areas which represent the teachers, trainer, and lecturer area of specialisation. This categorisation is relatively unproblematic, although other 'clusters' of disciplines would be feasible, and may well occur in specific national contexts.

From the perspective of our two institutions/countries, the overall structure appears somewhat complicated, consisting of five separate sections, some of which are further divided into foundation and advanced studies. This may be because the Hangzhou Conference which designed it was attempting what some would suggest is impossible – to find a structure which all delegates could agree on – the larger the number of delegates the more complex the final structure. Complexity may not necessarily be always a negative issue, although Barnett (2000) points out that as globalisation increases, so higher education is entering a world characterised by 'supercomplexity' which can have serious deleterious effects on both institutions' and individuals' capacity to cope.

The decision also appears to have been made that the master level of study should extend to both the vocational disciplines and the related pedagogical knowledge. This appears to be exemplified through Section 2, especially Vocational Didactics in the Discipline. Although this may be a misinterpretation, issues such as 'hands on planning', found in Module 6 and the other parts of this module, are areas in which a vocational teacher should have proved sufficient competence during initial training – i.e. at a lower level. This is not to argue against the need for improved practical competence based upon more sophisticated theoretical understanding – as for instance in continuous professional development – but that the inclusion of such a section, in what appears to be an already crowded curriculum, may not be necessary. In other words its omission would not in our view seriously compromise the integrity of a Master's programme.

Although it may be the case that the vocational knowledge required for pedagogical effectiveness should be placed at the master level, our experience leads us to believe that this is not always the case. It depends upon whether vocational knowledge is regarded as implicit within the pedagogy or as separate. This raises the question of whether the 'best' teachers need to be 'experts' in their field? It can be argued that

greater expertise brings about greater pedagogical skills and knowledge (Ramsden 1992). This is the view taken by the present authors and is reflected in the fact that admission to the Dual Award is done at the Bachelor's level. Prospective students must demonstrate their vocational competence at this level; but the expectation is that they will achieve the Master's level in terms of its pedagogical implications throughout the programme. This approach does beg the question of where to set the threshold level of vocational competence in an international context. Another reason could be that the framework is designed to enable a form of initial training within its broad compass. The document (International Framework Curriculum) is not clear on this issue since, although it makes reference to the minimum entry requirement. As would be expected in comparisons between an existing curriculum and such a framework as this, there are areas where the Dual Award fits and those where it does not. A few examples will suffice to illustrate this. The module 'Theories of Vocational Education' fits in quite well with Section 1 (International Framework Curriculum), 'Foundations, Theories and structures of education, TVET and HRD. In addition, a thesis is also required. The Dual Award dissertation or thesis is valued at 20 credits, whereas the Framework gives 15. There is nothing equivalent to Section 3 'Studies of the vocational discipline and its didactics', either at the Foundation or Advanced Level, for the reasons given above; but the 'Internship in Initial & Continuing Vocational Education Providers' in the Dual Award appears to be equivalent to Section Five, 'Practical Studies'.

The Dual Award meets the Organisational Criteria of the International Framework Curriculum since both institutions:

- are entitled to issue doctoral degrees
- run research programmes; personnel hold appropriate qualifications
- have a range of related occupational/discipline domains
- collaboration on international projects which relate to the programme of study.

## Conclusion

This paper has examined the development of the Dual Master's award in TVET between two European Universities. It has considered aspects of internationalisation, curriculum structure, principles of curriculum design, and degree awarding with the proposed International framework for a master's degree for TVET teachers and lecturers. It concludes that the current Dual Award programme meets some of the principles of the framework but not all of them. This begs the question of the overall function of the framework. Is it meant to be an 'enabling structure', facilitating development through commonly agreed principles, with the intention of encouraging an increase in the volume of awards internationally in order to meet the aims of the Hangzhou Declaration (with which the authors are in broad agreement)? Or conversely, is it meant to be a step on the way to the establishment of a set of international standards to be used in assessing aspects of the quality of both existing and proposed programmes? Whilst the two possible functions of the framework are not mutually incompatible, in the sense that standards can be used both in the development and evaluation of curricula, they would in our judgement need further development for use in either context. If the developmental context is to be paramount, then it might be beneficial to consider using an outcomes model (as described earlier in this paper) rather than the current input model. If the quality assessment (or other terms such as 'control', 'assurance' or 'enhancement') function is to be the focus, then questions must be asked, such as:

- 'Who/What organisation(s) will develop review standards?'
- 'What measures would be put in place to check programme' adherence to the standards?'
- 'What are the bureaucratic implications?'
- 'What are the costs? (e.g. of accreditation)'
- 'Who will pay?'

We look forward with interest and expectation to being part of this continuing debate.

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## On Problems and Countermeasures in TVET Master Education

### Abstract

Problems and confusion frequently occur in the education at the master's level in technical and vocational education and training (TVET), one of which is the difficulty in harmonizing knowledge acquired with designing a curriculum. The authors would like to introduce the following suggestions:

- I. Training Goals with Reasonable Regard for Both Academic Standards and Applicability,
- II. Emphasis on Practice under Theoretical Guidance in the Curriculum,
- III. Advantages of Both Professional and Part-time Teaching Staff,
- IV. Combination of Both In-class and After-class Education and Practice,
- V. Examination Items with Theoretical and Practical Values.

Theoretical support and practical guidance are badly needed in China so as to raise the level of technical and vocational education and research. China started its TVET master's degree program in 1988. It began with only two students; but now there are several hundred, with more than 25 Master's Posts and 3 Doctor's Posts. With the constant development of TVET master's education, the new TVET master's posts have encountered many problems --- specialization development, social needs, personal development and employment, which is, in fact, a question of how to harmonize knowledge and application in developing the curriculum. We would like to share the following results of our research.

## Training Goals with Regard to Both Education and Employment

Ever since the issuance of China's National Statutes of Academic Degrees in 1981, emphasis has been laid upon research abilities, and the education and training of top-quality researchers for more than 25 years. However, with both social and the economic developments, and the strengthening of master's level education, demand is increasing for higher grade professionals with distinct academic backgrounds and practical expertise. As far as TVET master education is concerned, there are now three different types of educational institutes dealing with this: engineering colleges, teacher training colleges, and TVET teacher training colleges. We hold that programs at the master level should be varied and it must center upon recognizing the features of different subjects, with concern for future employment possibilities. Without research, postgraduate students will never be higher grade teachers who are capable in both administration and research. A pure research orientation, as far as postgraduate students' academic ability and potential for development are concerned, can never meet the training goals. So, TVET master education should not only meet ever-changing social conditions, as well as a trainers' personal needs, but it should also consider the trainers' future development. We emphasize that in variety there is unification, i.e. maximum coordination of education and applicability.

## A Training Program with Regard to Both Education and Applicability

For any specialization, the contents should be carefully selected and well organized, and they should be closely related to the goals of the curriculum. TVET education is no exception. The goals are to strengthen the research ability of TVET in both theory and practice, as well as improving the quality of professional teaching and educational administration. So we hold the view that TVET is a comprehensive education in and of itself. By emphasizing practice under theoretical guidance and taking away the monotonous pedantry of the old-fashioned education, we have designed a curriculum in which we lay emphasis upon four types of activities:

1. Theory Type – basic principles of TVET education, specialisation, and pedagogical principles, etc.
2. Technique Type – techniques for curriculum development, training, methodology



for educational evaluation and professional guidance, etc.

3. Research Type – educational research methodology, presentation and exchange of research achievements, etc.
4. Practice Type – educational practice, research practice and social investigation, etc.

The goals of the TVET master's curriculum are to consolidate the foundation of professional knowledge, i.e. cultivate students' interest in theories, have them master technique and learn methods. With a well-planned training programme, tutors must discuss with each and every student, in order to draw up a special and reasonable training plan for each of them. This helps them to recognize and respect the students' own interests and personalities, which will help them to advance their personal development. A TVET teacher should abide by the syllabus which, as an outcome of this collaboration, is logical and kept up to date.

## Teaching Staff, Professional and Part-time

For a long time, the TVET master programmes in China has not responded and adapted well enough to societal changes and demands. The reason is that learning institutions and society have not paid enough attention to each other. There have been deficiencies in the structure of the teaching staff, and disadvantages exist in the Technique Type and Practice Type courses at TVET universities. We have recognized these defects – a lack of knowledge assimilation, backwardness, and rigidity have resulted in an inflexible, single minded type of teaching staff. Now we have purposefully invited both theoretically and practically experienced TVET researchers/practitioners as part-time teachers into the teaching staff, so that different schools can communicate with each other. The main principles for appointing the part-time teachers are:

1. professionals with doctor's degrees, with broad experience in TVET education and/or administration,
2. professionals with research ability in a certain field, or those with special grants for research projects relevant to TVET,
3. professionals who are qualified to lecture on special or elective courses and to tutor graduate students independently.

Based on the above principles, the teaching personnel now consist of theoretically knowledgeable professional teachers, well-experienced educational administrators, TVET college researchers and legislators in TVET. With both professional and part-time teachers, the TVET master programme is now standardised, streamlined, and effective. We have also made reforms in teaching methods by adopting "group instruction," as well as individual tutoring conducted by teachers with different academic backgrounds, and different styles of teaching. This process of exchanging experiences with complementary skills greatly improves the quality of the TVET master programme.

## Combination of Both In-Class and After-Class Education

Many postgraduate students have studied to pass their examinations, and they have developed the habit of learning to pass examinations but never wanting to do anything more. To solve this problem, we have supplied plenty of material for teaching and learning:

1. reference books recommended by teachers, exchanging books between schools, sharing research achievements, etc.
2. teachers' notes with plans, ideas and research achievements, etc. for in-class teaching and discussion,
3. teaching outline of basic and important theoretical points, analysis frameworks, academic issues and special cases for study, etc.

The discussion method is frequently used in-class so as to cultivate the students' sense of questioning and challenging. As to the contents that need special and systematic teaching, teachers may, for instance, also arrange group discussions after giving general introductions. As to the projects that students can accomplish with their own research, teachers will arrange for one student to make a presentation of his project, while the other students participate in questioning and discussion. The teachers will particularly focus on offering guidance concerning the students' concepts, methods, attitudes, abilities, and qualities, etc. The after-class activities include regular lectures on the methodology of education and research – writing research reports, for example, analyses of certain occupations, mini-investigation and research projects. In the curriculum, self-teaching and independent research are highly encouraged.

## Examination Items Cover Both Theory and Practice

We hold that the combination of theory and practice should be the theme of TVET master's education and therefore the examination items and methods must suit the theme. The items tested must have academic and practical value, and they should test the overall competency of students and encourage them to consider questions and solve problems using new ways of thinking.

Examination items for theoretical courses include a research review in which knowledge and reading comprehension are tested, theoretical analyses that tests scholarly research ability, and a practical application in which professional abilities are tested.

One example is the examination in "Principles of Education". Here the students are required to write a book review from which their abilities of reading comprehension and comparative analysis can be tested. In the theoretical analysis item, the abilities of analysis and research are tested by requiring them to make comments on the old educational principles from the angle of contemporary ones. In the practical application item, students are required to compare different curricula and teaching plans in a certain field from different countries. The aim of this is to enable them to understand the interrelation of educational realities and educational principles. As to the three items mentioned above, students are required to submit papers and reports, and then to debate certain topics, after which teachers will give a final evaluation. As to technical courses, students are required to submit technical reports and actual development projects.

This also applies to the examination "Educational Evaluation" in which students are asked to conduct investigations and give evaluations of the specialities offered in a certain vocational college or school. An evaluation report must be submitted. As to the items on TVET curriculum development, students are required to develop a teaching plan of a certain project which involves conducting investigations and drawing up a research outline, a work plan, arranging interviews, etc. This is intended to contribute to the development of the students' overall abilities.

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## Chapter 2

# Further Development of the International Framework



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## Vocational Disciplines – What could a general framework look like?

### Introduction

The International Framework for Master's degree programmes in Technical and Vocational Education and Training (TVET), which was adopted during the Hangzhou Conference in November 2004 (Veal, Dittrich, Kämäräinen 2005), proposed a set of twelve vocational disciplines (see Table 1). The reasons were:

1. The field of professional work shows great diversity. Each occupation has specific knowledge and skills associated with it. Teachers and trainers, whose role it is to support individuals in acquiring such knowledge and skills, should be familiar with the requirements of the occupational profile they teach. They should also be competent in the specific subject area and familiar with the objects, tools and organisational settings, which are found in the work settings of the respective occupational profile.
2. On the other hand, there are "families" of occupational profiles, which share common characteristics, like subject knowledge or economics, and which could be named an "occupational domain". The existence of such occupational domains suggests that teachers are educated for such a domain, and that TVET research concentrates on these domains, then called "vocational disciplines". With TVET teachers educated in vocational disciplines, it becomes possible to organise resources for teacher education and TVET research at universities.
3. Furthermore, teachers, trainers and other TVET professionals need to have a broad, and at the same time specific, overview of the working world in order to be able to play their role as actors in regional innovation processes.
4. A defined set of expertise fields facilitates international research cooperation, as well as making feasible international students and teachers exchanges. That way

the set of 'vocational disciplines' facilitates the development of internationally accepted academic profiles, which in turn helps to augment the reputation of these research and study subjects at the universities.

In order to get closer to these goals, it is necessary to develop a common understanding of what 'vocational disciplines' are, and, regarding the international Master framework, how they can be studied.

Even though there have been discussions of the layout of vocational disciplines in some countries like for example in Germany, we are still at the very beginning of the international discussion. We should be aware that we have to keep vocational disciplines open to requirements, which are specific to certain regions of the world, to countries or even to local regions.

In the following, I will present a proposal of how the vocational discipline can be filled with meaning and content. The proposal is meant to be applicable to all vocational disciplines, but may require further elaboration at certain points.

## **Areas of Competence of TVET Teachers and Trainers**

In order to define the contents of vocational disciplines for TVET teachers and trainers, it is necessary to have a clear picture of what professional teachers do and which competences and knowledge they need. Here I draw on a four-area-model, which was presented by Rauner (Rauner; Dittrich 2006), and which is based on long-running discussions in the German TVET teacher education community (c.f. Gerds et al 1993, Gewerblich-technische Wissenschaften 2004).

### **1. Occupational Profiles and Content of the Occupational Field**

The first thing a TVET teacher deals with is the design of training programmes and curricula which are developed according to the needs of students/trainees, industry, and society. Knowledge of occupational profiles and the subjects they deal with, how they developed over time, of procedures for development and evaluation, as well as the ability to analyse labour markets are needed in order to develop appropriate course offers in TVET.



Table 1: 12 vocational disciplines, as defined in the international framework curriculum

Vocational discipline		Vocational discipline	
Business and Administration	Production and distribution of goods Services Marketing, Administration, Finances, insurance Transportation, logistics, tourism	Education and Culture	Child and youth care Nursing education Adult education Special needs target groups Music and dance
Production and Manufacturing	Manufacturing Mechanical engineering design Supply engineering / environmental engineering Automotive engineering	Leisure, Travel and Tourism	Travel Sports Tourist services Catering and hospitality
Civil Engineering	Construction Wood Surface and coating technology	Agriculture, Food and Nutrition	Agriculture Food production Domestic economy
Electrical and Electronic Engineering and Information and Communication Technology	Production systems Building equipment Information and communication technology Media technology ...	Media and Information	Printing Electronic-advertising Electronic-customer-service Sales promotion
Process Engineering and Energy	Applied sciences Energy conversion ...	Textile and Design	Clothing production Fashion Interior design Art and craft
Health Care and Social care	Health care Clinical care Personal hygiene Nursing ...	Mining and Natural Resources	Mining Oil and natural gas ...

## 2. Analysis, Shaping, and Organisation of Work Processes

This area, which is central for work as a TVET teacher, covers the ability to conduct work and work process studies in the relevant occupational field. In that respect it

relies heavily on knowledge of the object of occupational work (see next field), and at the same time, mainly provides methodological competences which are needed not only to keep up-to-date with the changing world of employment but also take part in shaping those changes.

### **3. The Object of Professional Work**

We usually distinguish between services related to individuals, economic and technical occupational profiles, fields, and vocational disciplines. TVET teachers have to master their subject in terms of professional work. For example, while a student in electrical engineering at a university is prepared to develop electrical systems, a TVET teacher in the same field has to study electrical engineering from the viewpoint of selecting, planning and configuring, setting-up operations, and maintenance and repair. A similar situation arises, when one compares the work of physicians and nurses.

### **4. Analysis, Shaping and Organisation of Occupation-related Learning Processes**

This part of a vocational discipline enables the TVET teacher to teach and to develop learning environments which are appropriate for his occupational field. These competencies include, among others, the definition of educational goals, the selection of content and methods of teaching, and the ability to apply appropriate procedures for examination and assessment.

These four areas of competence are closely interlinked with each other, as already mentioned for areas 2 and 3. However, occupational profiles can only be analysed or developed with appropriate knowledge of the goals of the work, the tools and methods which are used to manipulate objects and achieve goals, the organisational framework in which work takes place, and the demands which are posed from different sides, e.g. the company, the legislation, the customer, and society.

## **Previous Education of Master Students**

It is clear, that these areas can not be mastered from scratch in a Master's programme with a duration of roughly 2 years. Students have to have some prior competencies to enter the programme. The International Framework defines:

"The minimum entry requirements are degrees or equivalent competences to the Bachelor level. It is recommended to establish at the offering institution a commission which decides on issues concerning the study course, especially in terms of different career pathways and institutional settings in the different countries and of non-formal learning accreditation."

The framework does not define, in which subject area knowledge and/or experience is required. An ideal candidate would already have some knowledge at the Bachelor level in working and teaching a vocational discipline. However, based upon the German experience, this will not necessarily apply in the majority of cases. Rather there tend to be four typical profiles:

1. Candidates holding a Bachelor's degree in a field which is related to the subject of the vocational discipline. This could be an engineering degree in the case of a technical vocational discipline or an appropriate arts degree in the case of "Textile and Design" or "Media and Information".
2. Candidates holding a Bachelor degree in some education topic like general secondary education, but who do not have a background related to the vocational discipline
3. Candidates, who do not hold a Bachelor degree, but have extensive work experience in the occupational domain, perhaps with experience in instruction, e.g. Master craftsmen. They have some years of work experience and may have been instructors in apprenticeship programmes in their firm.
4. Candidates holding a Bachelor's degree in TVET which is related to the respective vocational discipline.

All these profiles pose different challenges. Considering the Master Framework (see Table 2), it seems to be necessary that candidates – to a large extent – already have the operational knowledge, which has to be taught in the vocational discipline. There is little space provided where teacher-students explicitly learn the "craft" of their occupational field, e.g. how to programme a CNC machine tool or how to prepare a meal. So the pre-condition for entering the Master's degree programme must be sufficient "technical" knowledge in the subject area.

## Vocational Discipline and its Didactics in the Master Framework

The common curricular framework for Master-level programmes in TVET teacher education has the following structure for incorporating the vocational disciplines into the student's programme (see Table 2):

### **Common core areas:**

Modules 1 and 2 – foundation studies on expertise in TVET,

Modules 3 and 4 – advanced studies on utilisation of TVET-related expertise;

### **Specialisation in vocational discipline and related didactic studies:**

Module 5 – foundations of the major vocational discipline and

Module 6 – didactics of the major discipline;

### **Complementary studies:**

Module 7 – area of specialisation in the vocational discipline and

Module 8 – area of specialisation in the vocational pedagogy;

### **Practical studies:**

Planning and organisation of teaching/training and learning processes;

**Master's thesis** (based on above indicated areas of expertise).

Modules 1-4 and module 8 cover the area of vocational pedagogy, while modules 5-7 are dedicated to the "vocational discipline". Nevertheless, it is worthwhile to note that modules 1-4 provide the basis for setting the focal area of interest – i.e. skilled work in specialized occupational and professional areas – into context. Further, module 8 draws on specific areas of application, which are found in specific occupational domains. Therefore, the idea of 'vocational disciplines' is central to the whole curriculum.

At this point, it is important to emphasise that 'vocational pedagogy' is strongly related to the field of application, i.e. the respective vocational discipline, and that it will also include knowledge and skills in the area of concern. In the following, only the area of the Master framework, which deals explicitly with the vocational discipline, is addressed.

Table 2: Modules of the international master framework explicitly dedicated to the vocational discipline

		credits
<b>Module 1</b>	<b>Foundations, theories and structures of education, TVET and HRD</b>	<b>12</b>
M1-01	Foundations and theories of education, TVET and HRD	3
M1-02	Institutional and technical pre-requisites of TVET and HRD	3
M1-03	TVET and HRD in an historical and cross-cultural perspective	3
M1-04	Learning in work-processes and working in learning-processes	3
<b>Module 2</b>	<b>Shaping TVET connected to the vocational discipline</b>	<b>9</b>
M2-01	Development and evaluation of vocational curricula, media and learning environments	3
M2-02	TVET in theory and practice: Foundations of vocational teaching and learning, innovation, development and organisation of learning-processes	3
M2-03	Human development, learning and education in the framework of initial education and lifelong learning within its societal context	3
<b>Module 3</b>	<b>Teaching and learning in exemplary fields of practice</b>	<b>9</b>
M3-01	Application of methods and techniques of educational and vocational research and development	3
M3-02	Teaching, coaching and moderation of learning in career education and workforce development. Assessment and analysis of individual learning styles	3
M3-03	Development and application of media and learning environments	3
<b>Module 4</b>	<b>Management und evaluation of TVET and workforce development</b>	<b>9</b>
M4-01	Evaluation, measurement and exploration of educational supply and demands	3
M4-02	HRD and organisational development in TVET and workforce development	3
M4-03	Planning and development of programmes and courses - Methods of exploring work-process-knowledge	3
<b>Module 5</b>	<b>Vocational Discipline I</b>	<b>6</b>
M5-01	Introduction to the vocational discipline, history of the vocational field, standards and qualifications	3
M5-02	Occupational analysis and Curriculum development	3

<b>Module 6</b>	<b>Vocational Didactics in the Discipline I</b>	<b>12</b>
<b>M6-01</b>	Hands on planning, realisation and assessment of a teaching unit in the occupational discipline, application of discipline specific methods, media, and practical sessions.	9
<b>M6-02</b>	Learning in work-processes, occupational and work process studies and curriculum development	3
<b>Module 7:</b>	<b>Area of specialization in the vocational discipline</b> (working with specific research and development methodologies related to vocational disciplines)	18
<b>Module 8:</b>	<b>Area of specialization in vocational pedagogy</b> <ul style="list-style-type: none"> <li>• Human resource development</li> <li>• International, comparative and cultural studies on TVET</li> <li>• Vocational Education for target groups with special needs</li> <li>• Assessment and evaluation</li> </ul>	18

## Studying the Vocational Discipline

The vocational discipline (modules 5-7) is meant to have a total of 36 credits. According to the definition of credits, this would then account for a student's workload of roughly 1,000 hours, or about a third of the whole study programme. Another third is dedicated to the Master's thesis and to practical studies on planning and organisation of learning, teaching and training, which should also be closely linked to the vocational discipline. In the following, I will offer some suggestions, of what the specific content of the modules could be.

### Module 5

Module 5 deals with the first area of competence for TVET teachers and trainers, covering the knowledge of occupational profiles, and the content of the occupational field.

The **Introduction to the Vocational Discipline** course gives the students a first overview of their field of work. This includes information on the institutional settings of their future workplaces, on work areas and duties, and on the specific organisational and legal settings which apply to their vocational discipline. Here it might be also necessary for the student to have a change of perspective, depending on their previous professional socialisation. For example, students who are holding

a Bachelor's degree in electrical engineering should realise that their future subject will concern working with electrical devices, and will not concern the development of such devices. Knowledge of electro-physical laws is superseded by knowledge and skills on how to install, put in operation, and maintain and repair of electric and electronic appliances.

Knowledge about the **history of the vocational field, standards and qualifications** shall enable the students to develop a critical view on how the characteristics of work in the occupational domain are interlinked with changes in the economy, in technology, and in qualifications (e.g. occupational profiles, institutional settings, assessment procedures etc.). At the same time it should provide awareness of the latest developments, problems, and perspectives of TVET in the relevant occupational domain.

In **occupational analysis and curriculum development** the students learn to apply analytical methods which are suitable in identifying society's and industry's needs for skilled labour. Analysis is not restricted to mere figures, but also addresses questions of e.g. adequateness of skill profiles, legal standards, and any possibilities for improvements.

## **Module 6**

The first part of Module 6 offers – **hands on planning, realisation and assessment of a teaching unit in the occupational discipline, application of discipline specific methods, media, and practical sessions**. While planning, executing, and evaluating a teaching/training project, special emphasis is put on the application and reflection of TVET methods in environments, which are specific to the discipline. Discipline-specific methods and media are introduced, selected, implemented, and evaluated. At the same time, students acquire deep insight into a selected subject area, namely that for which the teaching unit is prepared.

The second part of Module 6 deals with **learning in work-processes, occupational and work process studies and curriculum development**, and tends to be more theoretical. Methods of work process analysis are introduced which allow the analysis of two related aspects of work: first, the knowledge, competences and skills used by skilled workers in order to perform in a specific work process, and second, how suitable a specific work process setting is in regard to the acquisition of the necessary knowledge, competencies, and skills. The analysis deals with the object of skilled work, the methods and tools used to accomplish the task, and the requirements, which are posed on the worker and on the product of work. The goal of

the application of such methods is the complete description of work processes. The descriptions are used for curriculum development purposes and for tailoring learning processes in TVET provision.

Module 6 covers mainly the 4th area of competence of TVET teachers and trainers, namely the analysis and organisation of occupation-related learning processes. It also provides methods for the analysis of work processes, which is part of the 2nd area of competence.

## Module 7

Module 7, entitled **Area of Specialisation in the Vocational Discipline** covers half of the entire vocational discipline (18 credits), and is dedicated to working with specific research and development methodologies related to vocational disciplines. This is quite a general definition, which has to be more clearly defined in order to form a basis for student and teacher exchanges, and for mutual recognition of credits.

Module 7 covers the two remaining areas of competence of TVET teachers and trainers, namely (1) **the object of occupational work** and (2) **analysis, shaping and organisation of work processes**. Here students acquire an in-depth knowledge of occupational work, using methods introduced in other modules and by studying specialised knowledge needed in the respective occupational domain.

That means, that professional work has to be studied in terms of:

- the object of work
- tools, methods and organisation which are used in work
- the requirements, which are posed on the worker and the product of work as well as in terms of the flow of work and business processes which usually can be coarsely structured in phases of
  - planning,
  - execution, and
  - assessment.

These studies are conducted in model fields of application in each vocational discipline, as it is not possible to cover all possible work scenarios in any given occupational domain.



## Module 7: An Example

It does not seem adequate to specify Module 7 in a more detailed manner because of the diverse character of vocational disciplines. It will be the task of the vocational disciplines themselves to specify the contents of this module. In order to illustrate how this could be done, an example used at the University of Bremen is presented below.

TVET teacher students in 'Electrical and Electronic Engineering and Information and Communication Technology' can choose between the following areas of specialisation:

**Production and Manufacturing**  
**Building Equipment**  
**Information and Communication Technology**  
**Media Technology.**

If students choose specialisation in Building Equipment, they will do in-depth studies in some of the following subjects:

### **Electrical Energy Supply**

- planning of electrical energy supply
- installation of electrical energy supply systems
- operation and maintenance

### **Illumination**

- Planning of illumination
- Installation, operation, and maintenance of lighting systems

### **Heating, ventilation and air-conditioning (HVAC)**

- Installation and operation of ventilation and AC systems
- Installation, parameterization, and operation of heating control devices
- Planning, installation, and Operation of electrical heating systems

### **Household appliances**

- Installation and repair of household appliances

### **Information and communication technology (ICT) equipment**

- Installation and Operation of ICT equipment

### **Building automation**

- planning of building control systems
- Installation and parameterization of building control systems
- Operation of building control systems

These in-depth studies not only provide expertise in the specific subject and in shaping related learning environments, but also enable the students to acquire expertise in other subjects when needed. The approach is closely linked to the paradigm of 'life-long and self-reliant learning', which is a must in an ever-changing job market.

## **Summary**

This paper tried to describe, how modules 5, 6, & 7 of the Master Framework can form a programme. Certainly, it does not provide a detailed syllabus for the 'vocational discipline' part of the study course, but it does suggest certain key elements, which can be elaborated on and used for the comparison of programmes at different universities. It should be mentioned that further experience and expertise in TVET teaching related to vocational disciplines will be acquired in the practical studies in planning and organisation of learning, teaching and training, as well as through work on the Master thesis.

The specific competences and knowledge, which have to be acquired in the course of study in the vocational discipline, will have to be identified and defined separately for each discipline. Here much work still needs doing, considering the number of vocational disciplines and the variety of possible areas of specialisation. I would like to invite everyone to contribute to the discussion on the design of the study course by contributing examples of 'best practice' and experiences in developing such courses. In this context I want to point out the forum of the UNIP website, which can be used for such discussions and exchange of experiences.

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## Modular TVET-Teacher-Training-System, Based on Teacher-Qualification-Standards – a Proposal of UNIP

### Challenges for Present TVET and Demands on TVET-Teacher-Training

In many countries technical and vocational education is currently undergoing a transformation as a direct consequence of fundamental political, economic, and social developments. Efforts are being made to find suitable concepts and approaches to tackle the new challenges for TVET. It is a simple but extremely important fact that the quality of vocational education crucially depends on the qualification and motivation of the teaching staff. This finding applies world-wide.

Furthermore, there is general world-wide agreement referring to the general goals and purposes of TVET. Every TVET-system has to:

- provide marketable and employable qualifications for everyone who is able and willing to work,
- facilitate the transition from school to work for all male and female high school graduates, including those with an incomplete general education,
- offer suitable continued professional development for upgrading and adjusting an individual's qualifications in order to cope with changing and new demands of the labour markets,
- offer inputs on the development of a growing economy and to create new jobs by fostering the chances of self-employment,
- provide the motivation for self-reliant and independent life-long-learning.

When we acknowledge these general functions that every TVET-system has to meet, it is evident that the training measures of TVET-personnel should reflect them. In other words, the goals, contents and organisational forms of pre-service and in-service teacher training have to be orientated toward the five functions of the TVET-system listed above.

Each country's TVET-system is influenced by global economic competition. The countries' economies and markets are part of the world market. Three types of countries can be distinguished in their role as competitor on the global market:

- a) those taking part in global competition as a full competitor with almost all of their products, production, and service modes (fully industrialised nations).
- b) those on the way towards being a full competitor (emerging nations).
- c) those beginning to become a competitor in certain areas, while needing foreign aid to continue growth (developing nations).

For a, b, and partially for c countries, the influence of TVET is seen in the products, quality, meeting customer demand, as well as in availability.

Influence is also seen in production and services, especially in its effectiveness in relation to price and quality. Last but not least, it is related to employee satisfaction in their work and compensation.

The main challenges for TVET are:

- increasing accountability of workers for their products and services
- increasing worker participating in shaping their work environment
- increasing self-reliance and life-long learning

In addition to this, TVET-Teacher-Training in developing countries has to take care not to lose touch with current problems such as:

- high rates of unemployment, and below average qualification of the workforce
- importance of the informal sector and small and micro-sized enterprises for providing income and providing school-to-work-transition
- gender-specific division of labour and labour-markets
- co-existence of some relatively highly sophisticated companies (with demanding working requirements) in an underdeveloped environment
- big gap between urban industrialised cores and rural remote areas,
- weak linkages between formal technical/vocational education and the demands of local labour-markets and work conditions on the shop floor
- predominance of agriculture, manual operated tools and work-processes,
- traditional trades and forms of work organisation,
- relatively low share of computer-controlled technology in companies

## **Conclusion for Establishing TVET-Teacher-Training-Programs in Developing Countries**

In planning TVET-teacher-training for developing countries, one has to consider the demands arising from globalisation and computer integrated modern production, while not neglecting the particular demands rooted in traditional forms of work and production. This wide range of challenges can only be overcome by a very flexible, highly differentiated and cost-effective TVET-teacher-training-system.

### **a) Demands for High Flexibility in TVET-teacher-training programmes**

TVET-teacher-training programmes should be closely linked with the particular demands of local, regional and national goods, services, and labour markets. The teachers must be acquainted with the content and form of business in a country. In addition to this, neither rural nor urban, neither remote nor industrialised, neither traditional nor modern sectors of trade and industries should be neglected or preferred. Political strategies may ensure a harmonious development of all these disparate fields.

This can only be achieved by TVET-teachers who are able to:

- provide a narrow linkage between their own pre-service and in-service (initial) teacher training, and to use modern ways of distance- and E- learning;
- have command of the vocational (practical) skills and theoretical knowledge they need to train their students;
- establish and conduct strong relationships and networks between their schools and local/regional businesses
- develop demand-driven contents and forms (courses, programmes, modules) of TVET programmes
- recognise the large variety of student's demands, interests, and prerequisites in connection with their education

The best way to meet all these demands for flexibility in TVET-teacher-training is through a modular structuring of courses.

### **b) Demands for Highly Differentiated TVET-training Programmes for TVET-teacher Applicants with various Experiences**

TVET-teachers should have sound experience and knowledge in a particular vocational

field, and should have command of the skills required for doing the typical jobs and tasks in this field. This experience and know-how can only be acquired by practical situations in companies where professional standards for good performance have to be met. In addition, a TVET-teacher has to combine this practical "know-how" with theoretical knowledge when planning the proper steps for carrying out a task. Part of this is understanding "why" a vocational task will be carried out in this way and not in another. To "know why" is the result of theoretical studies and reflection based upon practical experience.

From this point of view, both practical experience and related theoretical knowledge are indispensable for a TVET-teacher. Most of the following four groups of applicants recommended for TVET-teacher-training-programmes tend not to have one or the other:

**(1) High School Graduates.** School graduates usually have neither practical vocational experience, nor knowledge on vocational related theories.

**(2) Highly qualified personnel from trade and business.** Experienced and qualified personnel from trades, businesses, and other vocational fields often have the skills needed for their occupation, but in many cases they have low levels of knowledge in the theoretical background of occupational subject areas.

**(3) Degree holders.** Degree holders from higher education institutes usually have sufficient theoretical knowledge, but in most cases they lack the practical skills required in a profession.

**(4) Teachers.** Teachers from schools who are interested in joining any in-service-teacher-training programmes usually have very different qualifications and may ask for practical skills training. They may want to brush up vocation-related theoretical knowledge, or they may need additional pedagogical training.

TVET-teacher-training-programmes should be open and accessible for applicants from all four groups mentioned above. Normally students from these groups have previous experience in very different domains. They also tend to display a wide range of performance levels, as outlined in the following chart.

For all these applicants, an assessment of their previous experience has to be carried out before joining any course of study.



Table 1: Levels of previous experience of different applicants when entering TVET-teacher-training-programmes (levels 1-4 in accordance with TVET-teacher-training-standards)

	Prior achievements in technical/vocational subject areas		Prior achievements in Pedagogical/ didactical issues
	Theoretical knowledge	Practical performance (Skills)	
(1) High School Graduates	1-2	1	1
(2) Highly qualified vocational personnel from companies	1-2	3-4	1
(3) Degree holders	3-4	1-2	1
(4) Teachers	1-4	1-2	2-4

Legend: 1=Beginner, freshmen; 2=Advanced freshmen; 3=Junior Expert; 4=Senior Expert

Table 1 marks the level of competence of different groups of applicants for TVET-teacher-training-programmes at the entry level. The level of competence, after having passed the programme successfully, in the main, is dependent on the programme's duration.

### c) Demands on TVET-teachers with Different Qualification Levels in Developing Countries

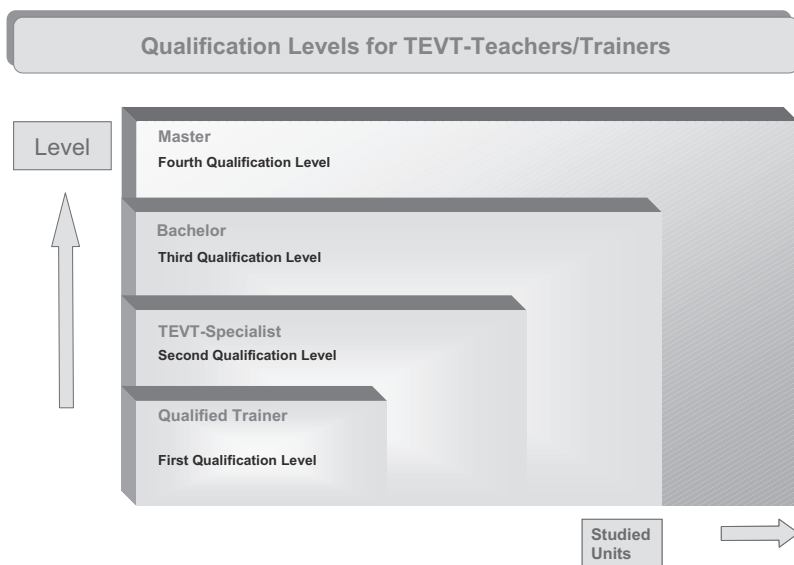
When planning TVET-teacher-training for developing countries, consideration must be made of a region's circumstances, in particular the relation between industrialised centres and rural/remote areas. Causes for differences are:

- traditional forms of work and production versus high-quality production for international markets
- wide range of students' learning background and previous achievement
- different quality of equipment, i.e. media in schools and training centres
- different needs of occupational qualifications for the formal and informal sectors.

If the qualification process of teachers is too demanding, their motivation and performance will decline at certain vocational schools.

TVET-teachers must then be educated at different but coherent qualification levels. "Coherent" means every higher level is based upon the previous lower level.

Thus, teachers have the possibility of upgrading their individual qualifications in accordance with the needs of vocational schools and their own intentions. Figure 4 shows an example of possible qualification levels.



Hoepfner, BOBB/Gerds ITB 2003

Fig. 1: Qualification levels for TVET-teachers/trainers

## Examples for the Description of TVET-Teacher-Qualification-Standards

Based on an APEC Central Funding Project, which includes Brunei Darussalam, China, Indonesia, Japan, Republic of Korea, Malaysia, Mexico, Chinese Taipei, the USA, and on a German-Ethiopian Technical Cooperation Programme, we recommend the following procedures for the definition of TVET-teacher-qualification-standards: The set of fields of standards can be described as follows (second draft of fields of standards):

### **Fields of TVET-teacher-qualification standards**

- (1) Planning, conducting, and evaluating teaching lessons and instruction
- (2) Providing occupation-related learning environments, materials and media
- (3) Assessment
- (4) Guidance and placement of students
- (5) Curriculum development and evaluation
- (6) School/TVET-institution management
- (7) Public relations
- (8) Research
- (9) Professional development

Each of the nine fields of standards is going to be assigned a set of standards on the following four levels of qualification:

#### **(1) Plan, conduct, and evaluate teaching lessons and instruction**

- Level 1 (Qualified Trainer): Plan, conduct, and evaluate work-process related teaching units
- Level 2 (TVET-Specialist): Plan, conduct, and evaluate work-process related teaching plans
- Level 3 (Bachelor): Plan, conduct, and evaluate integrated teaching units and plans
- Level 4 (Master): Assess one's planning, conducting and evaluating of teaching units and plans

#### **(2) Provide occupation-related learning environments, materials and media**

- Level 1 (Qualified Trainer): Prepare learning aids
- Level 2 (TVET-Specialist): Design and select training materials and facilities
- Level 3 (Bachelor): Select and produce teaching media
- Level 4 (Master): Co-ordinate the design of a variety of training materials

#### **(3) Provide and conduct assessment**

- Level 1 (Qualified Trainer): Carry out assessments
- Level 2 (TVET-Specialist): Design assessments for learning programmes
- Level 3 (Bachelor): Design and moderate assessments for learning programmes
- Level 4 (Master): Manage quality assurance system

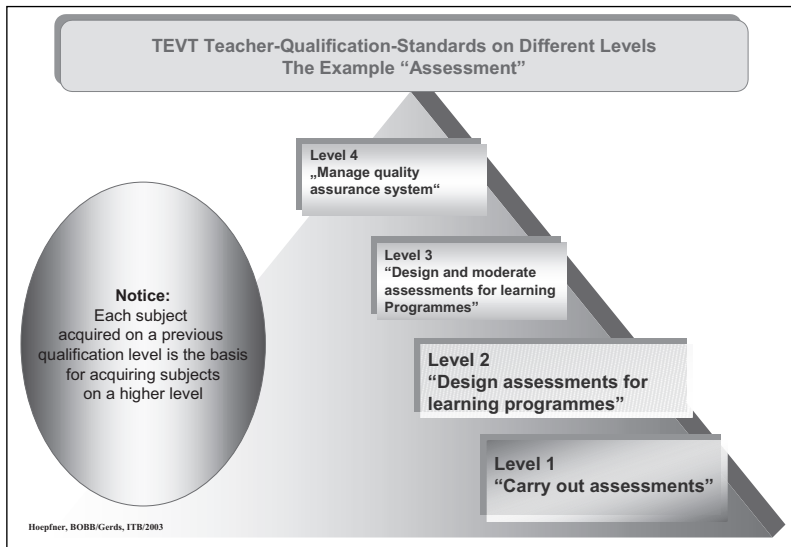


Figure 2: TVET-teacher-qualification-standards on different levels – The example "Assessment"

#### **(4) Guidance and placement of learners**

- Level 1 (Qualified Trainer): Advise learner
- Level 2 (TVET-Specialist): Provide vocational guidance to learners
- Level 3 (Bachelor): Guide and support learners
- Level 4 (Master): Plan guidance and placement of learners

#### **(5) Curriculum development and evaluation**

- Level 1 (Qualified Trainer): Determine occupational work assignments and design learning and work assignments
- Level 2 (TVET-Specialist): Carry out labour market analyses and give training inputs for creating more self-employment and business opportunity
- Level 3 (Bachelor): Conduct labour market and job analyses, and set up modules for TVET
- Level 4 (Master): Conduct occupational analyses and corresponding curriculum design, experiments, and evaluation

#### **(6) School/TVET-institution management**

- Level 1 (Qualified Trainer): Carry out teaching and teach file management
- Level 2 (TVET-Specialist): Conduct teacher and student management
- Level 3 (Bachelor): Participate in producing school development plan
- Level 4 (Master): Conduct demand-driven school-programme-planning and organisation

#### **(7) Public relations**

- Level 1 (Qualified Trainer): Demonstrate teaching achievements to the public
- Level 2 (TVET-Specialist): Produce publicity materials
- Level 3 (Bachelor): Produce plans for public relation activities
- Level 4 (Master): Conduct communication- and co-operation networks between school and local/regional industries and businesses

#### **(8) Research**

- Level 1 (Qualified Trainer): Carry out elementary field research
- Level 2 (TVET-Specialist): Conduct elementary field research
- Level 3 (Bachelor): Design and conduct research
- Level 4 (Master): Design, conduct, and co-ordinate research

#### **(9) Professional development**

- Level 1 (Qualified Trainer): Apply methods for self-reliant learning
- Level 2 (TVET-Specialist): Guide and help peers' professional activities
- Level 3 (Bachelor): Engage in professional development
- Level 4 (Master): Plan professional development in outside organizations

The proposal for the design and contents is to be based on the standard field (3) "Provide and conduct ASSESSMENT", as shown in the appendix.

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## Appendix

**Field of standards: (3): "Provide and conduct Assessment"**

**Qualification level at entry of the module:** Not required ("0")

**Qualification level at exit of the module:** Qualified Trainer (L 1)

**Credit value:**

**Issue date:**

**Review date:** This standard should be reviewed within two years of issue

### Purpose

A practitioner who has achieved this unit standard will be able to carry out an assessment using a limited range of methods, activities, and instruments for different assessment situations.

This competence will complement and enhance other competencies the practitioner may have.

It will also contribute to assuring the quality of education and training in line with the aims of the National Qualification Framework.

### Learning assumed to be in place

A practitioner applying to enter a learning programme for this standard – or applying to be assessed against this standard – is assumed to have qualifications or equivalent competence in an occupation in which they will practice this competence.

This standard describes the competence, which will be needed for them to carry out assessments related to their occupational competence.

### Specific outcomes

A practitioner assessed as competent against this standard will be able to:

1. Plan for the assessment by, e.g.,

- establishing/identifying the purpose of assessment by holding consultations/discussions with the learner (s) and other relevant

- parties;
- selecting appropriate methods of assessment, taking into account the purpose, environment, and evidence to be collected;
- selecting appropriate assessment activities and instruments to ensure the evidence gathered is adequate to prove competence
- 2. Prepare the learner for assessment by, e.g.,
  - explaining assessment process, appeals procedure, purpose, methods and documents to the learner (s);
  - discussing student's learning requirements, prior knowledge and experience;
  - agreeing on logistical arrangements with the learner and relevant parties.
- 3. Carry out assessment by, e.g.,
  - putting the student at ease;
  - carrying out assessment according to established assessment principles.
- 4. Make assessment decisions about learner's competence by, e.g.,
  - evaluating evidence collected against assessment criteria.
- 5. Record assessment results by, e.g.,
  - recording outcomes of the assessment in line with organisational and national requirements.
- 6. Give feedback to the student by, e.g.,
  - giving feedback continuously in an appropriate environment, to the learner and other relevant parties;
  - giving feedback in an affirming, constructive, and interactive way.
- 7. Evaluate the way in which assessment was carried out by, e.g.,
  - identifying strength and weaknesses in the practitioner's own performance;
  - making plans to integrate lessons learned in future assessments.

### Assessment criteria

The assessment of practitioners against this standard should meet the requirements of established assessment principles.

It will be necessary to develop assessment activities and tools which are appropriate to the contexts in which practitioners are working. These activities and tools may include an appropriate combination of self-

assessment and peer assessment; formative and summative assessment; portfolios and observations; etc.

The assessment should ensure that all the specific outcomes, critical cross-field outcomes, and essential embedded knowledge are correctly assessed.

1. The specific outcomes must be assessed through observation of performance. Supporting evidence should be used to prove competence of specific outcomes only when they are not clearly seen in the actual performance.
2. Essential embedded knowledge must be assessed in its own right, through oral and written evidence. It cannot be assessed only through observation of work.
3. The specific outcomes and essential embedded knowledge must be assessed in relation to each other. If a practitioner is able to explain the essential embedded knowledge but is unable to perform specific outcomes, they should not be assessed as competent. Similarly, if a practitioner is able to perform specific outcomes but is unable to explain or justify their performance in terms of the essential embedded knowledge, they should also not be assessed as competent.
4. Evidence of the specified critical cross-field outcomes should be found both in performance and in the essential embedded knowledge.
5. Performance of the specific outcomes must actively affirm target groups of learners (students) and not unfairly discriminate against any learners. Practitioners should also be able to justify their performance in terms of these values.
6. Occupation directed TVET practice is intended to contribute to the goals outlined in the work process oriented curricula. Practitioners should explain how their performance does this.

### **Accreditation process**

1. Anyone assessing a learner against this unit standard must be registered as an assessor.
2. Any institution offering learning that will enable achievement of this unit standard, or will assess this unit standard, must be accredited as a provider. Therefore anyone wishing to be assessed against this unit standard may apply to be assessed by any assessment agency, assessor or provider institution, which is accredited



### **Range statements**

The following statements provide a general guide to the scope and complexity of the competence expected of a practitioner.

1. The practitioners are required to demonstrate that they can perform the specific outcomes with understanding and reflexivity. However at this level they will be consciously following a set of rules or principles, which inform him what is to be done, rather than performing "internalised rules".
2. The practitioner is required to demonstrate the competence described in this standard in the context of TVET courses.
3. The specific outcomes should be performed in line with an established methodology for conducting an assessment. At this level, the practitioner should be able to describe one alternative methodology; to explain how their performance would differ if they used them, and to justify their choice of methodology.

At this level, the practitioner is not expected to draw on or integrate insights from beyond their occupational competences.

### **Critical cross-field outcomes (Key qualifications)**

The following examples illustrate some of the ways in which this unit standard supports critical cross-field outcomes.

1. Identify and solve problems, by, e.g.
  - identifying student's barriers during feedback sessions
  - deciding when to deal with the barriers oneself, and when to refer the learner to someone else whom you have identified;
  - identifying factors that would make an assessment unfair or unreliable and then removing such factors.
2. Collect, analyse, organise, and critically evaluate information e.g., analyse evidence collated and observed during assessments and make judgements about the competency of the learner against the relevant unit standard criteria.
3. Communicate effectively e.g. communicate with the learner in a way that is non-threatening and promotes future communication and common understanding.

### **Essential embedded knowledge**

The practitioner is able to demonstrate knowledge und understanding of the following:

1. Principles of assessment,
2. Outcomes-based methods of assessment,
3. Assessment purposes – including admission, placement, formative or diagnostic assessment, summative assessment, and recognition of prior learning,
4. Feedback procedures,
5. Different types of assessment activities,
6. Outcomes-based forms of conducting assessments, which are consistent with the aims and objectives of the National Qualification.

## Chapter 3

# **New Vistas on International Research TVET and International Collaboration in TVET and TVET Teacher Training**



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## Research for TVET Policy Development <sup>2</sup>

### Research on TVET Policy Making

What questions could be addressed by research (in the wider sense) in order to assist the development of national policies on Technical and Vocational Education and Training (TVET)? The specifics will very much depend on the national context. However, I shall attempt a sketch of research questions which may have some general relevance for what I see as current trends and issues in international policy discussion concerning TVET.

Policy studies are a wide field that is also concerned with the sources of policy, and the process of policy formulation, asking in particular: "Who exerts influence?" , and "Who benefits?". The field also includes empirical studies of the role that research could play, and does play, in decisions on complex social issues.<sup>3</sup> I shall here address a narrower set of questions, with regard to TVET: What knowledge might be useful for decisions when policy makers weigh options and choose among them?

I do not start from some social-engineering perspective that would reduce complex policy choices to matters of technocratic expertise guided by "science". Research has a more limited part to play and cannot replace the need for "judgement" in the face of much uncertainty. Nor can it replace constraints on what options are politically acceptable. Nor can it tell us what values are most important as lodestars for policy. However, research can play a role in reducing the range of uncertainty and in building stronger support for some options, while weakening the grounds for others. Once decisions are taken and policy is being implemented, research can also play a role in adjusting the course by evaluating implementation, and assessing the impact of new policy.

I shall inevitably point to "questions for research" to which answers often are wanting. As with much else in social science, the answers which exist in some studies are not definitive, but evolving, and there are areas of research in which controversies are common, with research used in support of arguments on "both sides". A prime example is policies which give more play to the market mechanism in education. But

in any country where policy makers are considering the need for radical restructuring of TVET, there is a clear need for policy making to be informed by research on these matters, and such research should also show cognizance of the controversies which exist.

It is recognized that it may be beyond the capacity of TVET researchers in any one country to quickly address the wide range of issues suggested below, if an updated "state of the arts" assessment is requested for policy formulation of TVET. However, the agenda of issues and questions is not beyond the capacity of what international agencies can address, especially with regard to **countries which are trying out new institutional models**. They should do more to review research for items of interest for the global agenda, commission studies in countries trying out innovations in TVET, and support international networks of research on TVET.

In addition to the questions which will be raised below, which mostly concern addressing relationships between TVET, resource requirements, and results, there will be a need for basic descriptive statistics about location and capacity of different types of TVET provisions. This is necessary for new policy development in any country. These are usually available for public provisions (but often not for private provisions and industry based training).

## Terms

I use research in a broad sense to include enquiry that is empirical and systematic. **Empirical** means to me a deliberately staged confrontation with sources of information. **Systematic** refers to procedures which seek information in a planned way and which use techniques to guard against error. **"Enquiry"** simply means that one seeks to find out what is unknown. Research needs a rationale to give it a clear focus and to provide reasons why this focus is important. If research is to be policy relevant, its focus and rationale must address matters which are relevant for policy decisions.

**TVET** refers to deliberate interventions to bring about learning which would make people more productive (or simply adequately productive) in designated areas of economic activity (e.g., economic sectors, occupations, specific work tasks). This is the distinctive purpose of TVET. However, TVET will also have other purposes which are not unique to TVET, and which also apply to other forms of education, e.g., knowledge, skills, insights and mindsets, which are deemed to be generally valuable for the learners, not just in designated areas of economic activity. Such "other" aims

will be especially pertinent for longer and full time courses for youth—in contrast to short and episodic training events (e.g., for persons already at work in the occupations concerned). TVET also needs to be conducted according to general social norms about how learners and people in general are to be treated by institutions, e.g., that persons be treated with respect. Thus “work productivity” is not the **only** aim and concern of TVET, but it is its distinctive objective which sets it apart from other forms of education and training.<sup>4</sup>

There are also learning outcomes which may not be stressed in TVET any more than in programmes of general education but which nonetheless are of great economic importance (e.g., a literate and numerate workforce, readiness to take responsibility and initiative and to learn new tasks). Thus, there is no need to assume that TVET is the only form of education which matters for performance in the workplace. In fact, in a rapidly changing society and economy, general education will of course be very important across economic sectors, and for important purposes other than just economic production; and there may be mindsets and norms of great importance for productivity which usually are acquired in other socialization arenas outside of schools and training centers (e.g, entrepreneurship, drive, reliability, honesty, endurance, etc).

**Policy** refers to a set of relatively stable goals, and the choice of a strategy to reach these goals over a considerable period of time. For national policies for TVET, the key goal will be improved productivity of the workforce. Holistic TVET policies will necessarily be concerned **with a wide range of target groups**: not only for youth still in school (who typically lack much work experience outside their home), but also people who are already employed and who need training on the job (or for other jobs), and those who are trying to become self-employed. In addition, certain groups are typically identified for special policy attention on equity ground, e.g., the unemployed, the poorest, the disabled, as well as women and girls, underserved ethnic groups. In particular “regional equity” is generally a driving force in politics. In addition, equity concerns focused on especially vulnerable groups often have a geographical focus, e.g., localities suffering a sharp drop in employment due to the restructuring of industry. However, equity driven aspects of TVET policies also need to be directed at labour market demand, for unless TVET leads to improved earnings for the learners, there is no equity gain either. The wide range of target groups for TVET in any society means that national policies cannot be confined to TVET for youth still in school. Policy has stages: diagnosis of problems and needs

for intervention at an early stage of policy preparation, formulation of policy, and follow-up, in order to carry out the necessary adjustments, once policy is in place. The type of questions suggested below are thought to be appropriate at the early stages of preparation and formulation of TVET policy, and when radical overhaul of policy is being considered.

It is recognized that even if radical restructuring of TVET is planned, only some of these questions may relate to alternatives that are considered in any one country. In some countries there has been experimentation with trying out some regions or localities, models which radically depart from the mainstream system. In such cases, policy formulation for the entire country can obviously benefit from the evaluations of such experimentation, but generally, there will be a need to look at international experience. Some of the questions suggested have been addressed in comparative analysis carried out under the aegis of international agencies involved with TVET (e.g., ILO, and international development banks). But for many issues, there is still much basic evaluative research to be done before there is much "experience" to tap into. <sup>5</sup>

## **Labour Market Monitoring and Forecasting**

A key element in TVET development is to develop feedback to TVET from the labour market, in order to adjust TVET so that it responds to market demands for skilled workers. This is especially important for publicly provided pre-employment training, probably less crucial for private enterprises that need to respond to demand directly in order to attract trainees,<sup>6</sup> and still less crucial for on-the-job training which already occurs in close conjunction with employment.

### **What will be the Future Requirements?**

Especially in market economies where labour is not assigned to public employment, and where firms need to adjust their own demand for labour in order to break even in changing market circumstances, conventional forecasting of labour market demand is notoriously inaccurate (certainly long term, but even in the medium term). Countries have for some time been abandoning "old style" manpower planning and are instead concentrating on mechanisms which give signals about current trends. However, under conditions of rapid globalization and technological change, "recent trends" will not suffice as signals for designing TVET for the future. Especially in countries which are not at the receiving end of the international diffusion of



technology and globalized trade, policy making for TVET needs to be informed about how technology – which is currently “mainstream” in a given economic sector in the country – may be transformed by innovation already being diffused from technological nodes in other countries. Research has a role to play in attempts to forecast implications for TVET--and for general education--from change in technology and in international patterns of trade, which are in “the pipeline”. Since such forecasting will be fraught with much uncertainty, it is better thought of as involving certain scenarios, rather than clear predictions.

### **Labour Market Observatories**

Some countries have experimented with “Labour Market Observatories” (there are several African examples). A common feature of such observatories is that they are supposed to collate statistics on changes in the labour market, conduct their own special surveys to provide ongoing feedback to TVET at national, regional and local level so that TVET can be adjusted accordingly. What are the lessons learned, internationally, from such attempts? Do they succeed in producing sufficiently updated and sufficiently local information about labour market absorption of trainees from different training backgrounds? Do they show trends in vacancies in different specializations? Can they also be made to provide feedback as to the actual uses of skills learned, from the surveys conducted? Does the information reach decision makers on curriculum and expansion of training specialties? Is the information of any use to them? Do they actually use the information to adjust the supply of trainees?

### **Panels of Employers**

Some countries (e.g., Denmark) have abandoned reliance on statistics and surveys as a main source of guidance about labour market demand, and have instead set up local panels of employers from the industry of concern. What are the lessons learned from experience with the use of local or regional panels?

## **Indicators of Performance**

Performance indicators of the kind set out below are important in several regards: taking stock of one's existing TVET which new policy will seek to improve upon, assessment of the strengths and weaknesses of institutional models which exist in

other countries and which may be of interest in a new policy in one's own country, and monitoring the performance of models brought in by new TVET policy.

### **"External" and "Internal" Effectiveness**

What indicators are there of the external effectiveness of TVET? Does it improve chances of finding work? Does it lead to "relevant work"? Does it lead to added income for trainees? Apart from collating existing information from within the country in order to assess such questions, research can address international experience with attempts to institutionalize indicators that address such questions. Are there gains from seeking to institutionalize tracer studies (as in Mauritius)? Is the information put to much use?

A similar set of questions can be asked about internal effectiveness. Statistics on pass rates or marks achieved on exams are typically available. But these do not really say much about what is learned—which may be termed the internal effectiveness of TVET. Since the 1960s a network of collaborating countries has emerged (e.g., IEA, PISA) to test children and youth in certain general education skill areas. Though international standards of TVET do exist (e.g., ISCO) (there are even international TVET Olympics!), so far there is no similar network of collaborating countries with regard to TVET. Meanwhile, there are grounds in any country for research to address the question: What is actually learned in TVET? With the increased use of criterion referenced assessment (to "pass" it takes demonstrated mastery of specified tasks), it should be possible to check actual mastery of tasks.

### **Equity**

Equity is especially problematic for TVET. How equitable is recruitment to TVET from underserved groups? Do new policies achieve an improvement in this regard? (e.g., the poor, underserved minorities, women and girls). The geographical inequality of economic dynamism presents special problems for TVET in locations which are remote from the nodes of that dynamism. The more TVET policy stresses the need to reach out and involve "local industry" in TVET, the more TVET provisions become embedded in geographical economic inequality. Private provisions will typically add to that inequality for they will be strongly concentrated in locations with high local demand for skilled labour. So there is a case for government acting to offset the imbalances which are created by earmarking special resources for TVET catering to "underserved" locations and groups. However, these TVETs often will lack good and

direct local connections with industry. Do their trainees suffer problems in finding jobs? Are there examples of initiatives taken to ease such problems? What do such initiatives achieve?

### **Cost**

Part of policy preparation is cost analysis. Annual costs of established TVET institutions are usually available, but surprisingly often cost analysis of different training specialties within the same institution are lacking, and cost estimates do not show the combined costs of recurrent expenses and annualized capital expenses. How can the accuracy of cost information be improved? How do we ensure use of cost information?

### **Efficiency**

A series of "internal efficiency" questions relates to the flow of students or trainees in and out of the courses. Applied to TVET, this would especially concern longer courses which are "pre-employment", rather than short "training events", and training within industry itself. Questions include: What are course completion and drop out rates in different types of courses? Other indicators (regrettably rarely available) are capacity utilization of facilities, and the availability of human resources.

Benefit-cost analysis is sometimes attempted with TVET (usually Internal Rate of Return estimates), in order to estimate what may be termed external efficiency. It is a method which has been both widely espoused and – especially as a means of estimating benefit-cost to society rather than merely to private persons – widely criticized. Research has a role to play in both critically assessing its potential and limitations, and in the application of such analysis.

## **"New Models" for TVET systems**

In any country open to radical reform of TVET, policy can be usefully informed by comparative research on experience with new models which have been tried out in other countries. Some new models include national training authorities, national training funds, and national qualifications frameworks. For all these models, which in recent years have internationally been in vogue, there is a need to systematize existing findings and generate new ones concerning such questions as: How do such policies work out in practice? What works

well? What are the shortcomings? What corrective action has been tried? What are the effects of implementation, cost, outcomes, and impact.

### **National Training Authorities**

Some countries have established national training authorities outside of ministerial authority. Typically, they have control of resources which different providers can apply to use, while at the same time they are supposed to exercise strategic planning and quality assurance purposes of TVET. They also typically have governing boards with strong representation directly from industry. What is the international experience with such structures (in countries like Britain, South Africa, Chile, and Tanzania)? **What are the lessons learned from training authorities?**

### **Training Funds**

A number of countries have set up training funds with diverse sources of finance. Typically, there are contributions directly from industry (from earmarked payroll levies, from government, and in poorer countries sometimes from external financing agencies). These funds are typically controlled by national training boards in which there is strong industry representation. Often they are developed in close conjunction with national training authorities, and private industries can themselves apply for such funding for some of their internal training activity. What has the international experience been with training funds?

### **Qualifications Frameworks**

A number of countries have developed national Qualifications Frameworks which typically seek to define the concrete skill requirements (standards) for specified occupations, to certify TVET courses as to level of skills taught in relation to such requirements, to define paths of progression in such courses so that all forms of TVET fit into a single unified framework, and to administer ways of certifying skill levels of individual persons when skills are informally acquired. Examples are found in Australia, Scotland, South Africa, and many others. **What are the lessons learned from national qualifications frameworks?**

### **Decentralization**

There has been an international trend to promote decentralisation of decision making in education. It is of course not ideologically "neutral". Different variants connect differently to influential ideas about how power and authority should be distributed

in a "good" society. There are also rationales connected with efficiency — that decentralisation is a means of making better use of scarce resources, of motivating people, and of enabling institutions to better achieve their objectives. <sup>7</sup>

For TVET, there is the "efficiency" argument that giving more power to each institution, and involving local industry more in its governance, are means of making TVET more locally responsive to industry and thus ensure an improved match between what is taught and what is demanded in the labour market. There is also the argument that public institutions can diversify their sources of finance and raise more funds by being enabled directly to raise local finance (e.g. "selling" short courses to local industry). Such an emphasis on "more local decisions" and more local involvement of external "stakeholders" typically accompany recommendations for changes in the way TVET is financed. One approach is to develop indicators of institutional performance and to tie public finance to such indicators, to a greater extent than previously. Another approach is to give more play to market forces and public institutions (for example, leaving institutions to recruit trainees in competition with others), without regard to fixed catchment areas.

In countries where TVET is tightly regulated by public bureaucracies, and where they are considering moves towards some form of decentralization, the following questions can be usefully addressed in research: **What are some of the institutional models of more decentralized operations, which exist today? What are the lessons learned from these operations?**

### **Alternative Models of Financing**

There is currently a discussion about the need for more diversified sources of finance in order to cope with high unit costs and tight public finances. In public institutions, this typically would mean moving from full (or nearly full) reliance on ministerial budgets, to (a) charging fees (or higher fees) to the trainees, (b) "selling short courses" to industry, (c) selling products produced in Production Units at TVET institutions (e.g., "training with production"), (d) setting up alternative channels of external funding by earmarking fiscal measures in the sector concerned (e.g., payroll tax). **What is the experience from the use of such alternative or supplementary sources of financing?**

## Encouraging Private Provisions

In international policy debate on TVET, there are arguments that national governments should take an increased "interest" in the role played by private providers of TVET. The extent of private provision varies greatly among countries, but in some countries private provisions are a major supplier of institutional TVET, especially in business/commerce related skills, and in ICT (Information and Communications Technology). An issue for policy is how government should relate to the private sector, with alternatives typically ranging from (1) "regulate in order to ensure minimum standards", to (2) encourage as supplement to public provisions, to (3) see public provisions as a supplement to private provisions and plan public provisions accordingly to fit around private provisions, to (4) set up accreditation, quality assurance, and funding provisions which put private provisions on a "level playing field" in competition with those that are publicly owned. Frequently statistics based on privately provided TVET are weak. Even if the minimalist option of (1), above, is chosen as policy, there is usually a need to design mechanisms for improved information on private provisions. Are there lessons learned from other countries in how best to achieve such improvement? With more "favourable" policy options, especially if government considers using public funds in support of private provisions, the need for information will be further increased. The private-public policy issue is ideologically fraught with problems and therefore typically subject to much controversy. **What are the controversies? Are there lessons from countries which have introduced various schemes of financing private TVET? For example, what is the experience with "vouchers" which a target group of trainees can "cash in" at any accredited TVET provider (private or public)? How do they handle quality assurance and monitoring of private providers? What are equity consequences of support to private provisions? Are private institutions any more efficient than public ones?**

## Schemes to Force Industry to Do More Training

A variety of interventions have been tried to force industry to implement more training programs than it does when left to its own devices (legislation "requiring" them to train, e.g. Korea, tax credits for training, e.g. Chile, funding by competitive application from national training funds, or from industry specific funds). **What are the lessons learned from different interventions?** One common experience is that it tends to be the large firms that make most use of available incentives, and that more is used on training staff at high levels, than the schemes originally intended.

Some countries have introduced changes to induce more small firms to make use of such incentives, and some (at least one, Chile) have adjusted funding to stimulate more training of production workers and less focus on management training. **What is the experience with such schemes?**

### **Modularization of the Curriculum**

In some countries, there has been a switch in TVET curriculum design away from "long courses", with assessment of learners at the end, to programs consisting of sequences of short courses (modules) with assessment at the end of each module (typically "criterion based"). They also offer more flexibility for trainees to sequences tailored for their particular requirements (and pace of progress). This approach is also advocated as a means to enable trainees to more easily "interrupt" and later "return to" training. What has been the experience of such modular models? Some of the issues are: **Is there improved quality of learning? Is "flexibility" made use of? Does it lead to excessive fragmentation or "assessment overload"?**

## **Human Resource Development**

Qualified TVET human resources are chronically lacking in many countries. At the most basic level, there is the problem of how best to institutionalize initial instructor training and how best to recruit instructor-trainees to such training. Small countries frequently have problems designing provisions for instructor training in the many vocational specialities in such a way that they avoid underutilization of training capacity. Large and small systems have problems ensuring that the pedagogy part of such training will be sufficiently relevant for the practicalities of skills taught in any given vocational specialty. There is also the problem of ensuring the recruitment of prospective instructors who have sufficient work experience from relevant industries; and if such applicants are available, how to screen out those who are the 'rejects' from industry. If industry is booming, there is the problem of retaining good TVET staff who then are tempted by higher pay in the occupations they are preparing others for. Throughout the world there is a shortage of in-service staff development opportunity for TVET instructors, so that they can keep abreast of technological changes.

**How do "other" countries cope with human resource problems for TVET? Are there schemes which seem to improve the training part of these problems? Are**

there workable and affordable incentive schemes to prevent loss of the best TVET staff to industry?

## Coping with Management Complexity

A number of the changes mentioned earlier (e.g., decentralization of decisions on what to teach and use of resources, competing with other training providers, diversifying sources of finance, involving local industry in boards of management) would add complexity to the management task of TVET at local institutional level. Does management of TVET institutions rise to the task of coping with increased complexity of their management task? How do they cope with "complexity overload"?

## Dual Systems of Basic TVET

There is internationally much admiration for systems of basic TVET which are "dual" in the sense of being partly based in training institutions external to industry (often public institutions, but they could also be private) and partly in industry itself. Some systems are 'dual' only in an "embryonic sense," in that the industry-based part is but a minor part which typically aims at "work experience" in the occupation concerned, without much specification on a list of skills to be learned (e.g., an "attachment"). Fully fledged dual systems (e.g., Germany, Switzerland, Austria) typically make the industry the main arena for training, with external institutional education and training as a concurrent supplement—in some other countries (Denmark, Norway) it serves as a foundation period before the apprenticeship in the industry commences. My understanding is that China is among those countries which have experimented with a dual system for modern sector TVET. It will then have its own experience that will be assessed in order for policy makers to judge whether the piloted models are to be expanded or not, and how they might need to be modified. Research has a clear role to play in contributing to that assessment. What has worked well and what has worked not so well? Research can also summarize the international experience, with attempts to develop and expand dual systems under different socio-economic circumstances.



## Low Dosage TVET in Mainstream Secondary Schools

In the mainstream of secondary education, some countries have introduced vocational or practical subjects as a minor portion of the total curriculum load carried by students who take these subjects. Sometimes such curricula are justified by the hope that such "low dosage" TVET will ease the transition of youth into those occupations or sectors for which the practical subjects are "relevant", and contribute to productivity there. Is that a realistic goal for such mildly "vocationalized" secondary education? What are the cost implications? <sup>8</sup>

## TVET for Illiterate and Semi-literate Learners

Many countries have sections of the adult populations who are illiterate or whose literacy (and numeracy) skills are too rudimentary for any fluent reading or written expression. Programs responding to demand for TVET from such groups will usually be self-targeted to people living in great poverty. In most countries, they are disproportionately women. Often they are minorities who are generally underserved with education and other social services. Therefore TVET-programs of this kind will usually serve strong equity goals. There is a case for combining such TVET with the teaching of basic literacy and numeracy skills. Similarly, in adult literacy programs, there is invariably a demand for skills which are directly useful for the "income generation". Attempts have begun to summarize, with a focus on the Sub-Saharan African experience, the international record of cost, implementation, and impact of such combined "TVET and Literacy" programs. <sup>9</sup> More evaluative work is needed to provide more strongly founded "lessons" than what can now be determined from current documentation—both within countries, and internationally.

## Keeping Abreast of Technology

Especially in a country like China, with much export dynamism, there must be a strong concern to ensure that TVET keeps abreast of technological changes in industry. One would expect there to be much learning within the industry itself: both formal and informal. One would also expect that training is often part of the package purchased from the supplier when new technology is bought by the firm. One would also expect

firms to “buy in” such TVET from private trainers or consulting firms. The question is whether government, or sectoral industry associations, can usefully intervene more in order to further these processes. Research can have a role to play assessing the experience in countries which are known for much training within industry (e.g., quality circles and certification of skill levels, in Japanese industry).

For institutionalized training providers outside of firms, the problems of keeping abreast of technology are especially severe. One would think that a good foundation in science and mathematics is helpful for learning new technology. How adequate is the present foundation for youth when they enter TVET, and does TVET pay enough attention to such knowledge and skills?

The more capital intensive training is, the more expensive it is to “retool” in order to keep abreast. Placements in “cutting edge” industry (not only for trainees but also for their teachers) are a long recommended recipe. But locally available industry is not always “cutting edge”. There is a role for research to take stock of experience with new approaches within a large country like China, and also look abroad to what others have achieved. For example, how far can ICT be a useful means of communication about new technology for TVET? What incentives can public TVET are given for keeping up with technology?

## Follow-Up Policy

The range of questions for research will naturally be much narrower when the focus is on the follow-up of new TVET policy. Looking at “alternative models” in order to widen the range of options for decision makers will be much less important. However, evaluations of different organizational models can still be on the agenda when the decision has been made to pursue more than one strategy concurrently, or simply to pilot a new form of TVET alongside currently dominant forms. Wise policies allow for a period when it is expected that new models will need to be adjusted (institutionally complex new forms of TVET are very rarely abandoned). Evaluations (in this paper, this means a part of “research”) are important for giving feedback that helps inform such decisions in “adjusting” implementation. There will also be a clear need to monitor resource requirements, since in any complex reforms of TVET structures these are among the “loosest” parts of the information base (usually the cost is underestimated, but since implementation tends to be slower than expected, the “higher” total costs may well be spread over a longer period than initially assumed, if

the intended full scale of implementation is in the end achieved). A badly neglected question for evaluative research on TVET policies involving complex reforms is impact. For example, does a "new style" TVET in fact improve the extent to which the skills acquired are put productively to use in "relevant" work? How are equity concerns accommodated? One does not need to be a cynic to note that there is often much risk in putting this last question to an empirical test. Governments in any event seem uninterested in commissioning research on that question.

## A Stronger Research Base is Needed

Research on TVET is quite limited in most countries. Few countries have specialist professional networks, and few have journals, ICT-based meeting places, or other means of supporting the development of professional "nodes" on TVET. Such research as exists is typically concerned with pedagogy and curricula because it tends to be an outgrowth of TVET teacher education. To the extent that there is research and review work done of the kind of policy issues touched upon here, it tends to be commissioned or carried out by international agencies (ILO, UNESCO-UNEVOC, international development banks, a few bilateral development agencies). What is characteristic of that work is that it is performed under great time pressure. If national case studies feed into it, they have to rely on existing documentation which is typically meagre. Thus, it is review work rather than research on primary data. Primary data collection is confined to visits to a few institutions and interviews carried out with persons in positions of responsibility. A major present deficiency is the sparseness of research carried out to collect good primary data.

- <sup>1</sup> Email: Jon.lauglo@ped.uio.no .
- <sup>2</sup> This paper is a revised version of a manuscript first prepared by invitation from the Government of the People's Republic of China through Tianjin University, and with sponsorship by the German agency InWent (the Magdeburg office). It was presented at an international conference in Tianjin, China, on 9<sup>th</sup>-10<sup>th</sup> December, 2005, which was organized in partnership between Tianjin University, InWent, and UNEVOC.
- <sup>3</sup> There is a literature on this. I would recommend as an opener to that literature: Charles E. Lindblom (2000) *Inquiry and Change. The troubled attempt to understand and change society*. New Haven: Yale University Press
- <sup>4</sup> I see "education" as all forms of deliberate interventions designed to bring about learning, and "training" as interventions specifically aimed to achieve mastery of performance in specified roles or tasks. There is however also in the Western tradition of educational philosophy an original concept of "education" which refers to enabling persons to "realize their potential" across a wide range of valued "human development" (e.g., ideas of "well rounded education").
- <sup>5</sup> It is beyond the scope of this paper to attempt a review of research that exists on all these issues. A recent attempt with regard to Sub-Saharan Africa covered a number of these questions but found a lamentably weak knowledge basis on such key issues as cost analysis, external effectiveness of TVET, and comparison of performance of private and public providers: Richard K. Johanson and Arvil V. Adams (2004) *Skills Development in Sub-Saharan Africa*. Washington: World Bank. The study occasioned a number of background papers on specialized topics. These are available on the web at <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSOCIALPROTECTION/EXTLM/0,,contentMDK:20223878~pagePK:148956~piPK:216618~theSitePK:390615,00.html>
- <sup>6</sup> For private provision, this can also be problematic. Those who are willing to pay the fees that private providers pay are not always very realistic about the labour market opportunities which training actually will lead to.

- <sup>7</sup> See e.g., Keith Watson (1996) (ed.) *Power and Responsibility*. Vol. 3. *Educational Dilemmas: Debate and Diversity*. London: Cassells; and Judith Chapman, William Boyd, Rolf Lander and David Reynolds (1996) (eds) *The Reconstruction of Education: Quality, Equality and Control in Education*. London: Cassells.
- <sup>8</sup> There is a recent book on this long-standing controversy in development planning: Jon Lauglo and Rupert Maclean (eds) (2005) *Vocationalization of Secondary Education Revisited*. Dordrecht: Springer (in collaboration with UNEVOC and the World Bank).
- <sup>9</sup> A website that gives some pointers and links is [http://www1.worldbank.org/education/adultoutreach/A report specifically on combined literacy and VET is at http://www1.worldbank.org/education/adultoutreach/Doc/Skills%20and%20Literacy.pdf](http://www1.worldbank.org/education/adultoutreach/A_report_specifically_on_combined_literacy_and_VET_is_at_http://www1.worldbank.org/education/adultoutreach/Doc/Skills%20and%20Literacy.pdf)



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# Modular Employment Oriented Curriculum Development

## Introduction

Vocational Education and Training (VET) increasingly plays a crucial role within development objectives and processes in different regions all over the world.

It is expressed on the one hand in declarations in developed countries – for example in the Copenhagen Declaration of the European Union<sup>1</sup> – where they stressed: "...the important role of education and training as an integral part of economic and social policies, as an instrument for strengthening Europe's competitive power worldwide, and as a guarantee for ensuring the cohesion of our societies and the full development of its citizens. The European Council set the strategic objective for the European Union to become the world's most dynamic knowledge-based economy. The development of high quality vocational education and training is a crucial and integral part of this strategy, notably in terms of promoting social inclusion, cohesion, mobility, employability, and competitiveness." <sup>1</sup>

Investing in human resources which is conducive to reducing unemployment and under-employment, providing people with employable skills and qualifications that supports and sustains competitiveness in a rapidly changing global economy, should be the main thrust of economic reconstruction. Taking these factors into consideration for economic and social development, it is suggested that investing in TVET-training makes good economic sense and will provide return of investment both for companies and the society at large. Therefore, the quality of training and retraining at all levels needs to be raised in order to match current and future changes in the labour market.

Actually, the existing vocational training programs have often not been demand-driven. They have not always provided graduates with marketable skills, knowledge, competence, and qualifications. This has resulted in a serious imbalance between labour supply and demand. Because decisions are mostly driven by limited funding

instead of the demands of the market, there is a prevalence of inappropriate curricula, lack of adequate training materials and equipment, and a fragmented system of under-funded institutions that tend to duplicate training efforts.

Today's labour markets demand a flexible and effective system of TVET that combines formal instruction with practical experience, and that respond to the changing needs for skills and competencies. Such a system should not only provide training for new entry into the labour market, but should also cater to retraining in the light of new skill requirements. In this respect, mechanisms to combat biases and prejudice, especially against women, immigrants, and ethnic minorities are vital. <sup>2</sup>

It has been recognised that the traditional monolithic TVET-programmes lasting from two to four years are proving increasingly inadequate for the needs of today's job market. Hence, there are various reasons for modularization within the TVET sector, including:

- greater flexibility in planning and organization of education and training programmes
- improved economic efficiency and effectiveness of education and training programmes
- greater adaptability to the needs of the labour market
- greater adaptability to individual needs
- real choice of personal advancement through various learning and training implementation processes that support the acquisition of professional qualifications for both vertical and horizontal mobility

Modules may be either independent or part of a wider training programme or learning environment, that leads to vocational qualifications.

In this context "Qualification Frameworks", combined with credit systems, are under development in different regions. For example Europe has the "European Qualification Framework (EQF)" linked to "the European Credit Transfer System in Vocational Education and Training (ECVET)". However, one of the preconditions for a well functioning credit system is modularization, which focuses on the establishment of training units, courses, and modules, as well as using them as elements in further training. The modules and elements of training (teaching and learning processes) are the basis for planning and developing the curriculum, which includes all types of educational work (lectures, practical training, individual learning, assessment, evaluation, etc.).



Despite that, a more common view of the advantages of modularization amongst VET stakeholders exist as a result of ongoing national and international discussions. There are some controversial views about the following components that make up an overall modular systematic approach:

- standard settings, especially in reference to details and desired level;
- assessment procedures, testing and certification of modular structured training programmes;
- the issue "modularity" versus stability a modular approach offers the advantage of rapid changes in meeting specific demands of employers needs, but at the same time may conflict with the need for coherent and well-defined competencies, which are stable but slow to change.

As the above mentioned components are pertinent and imperative in the overall process of modular training design, development, and implementation, it will be dealt with in this paper. As background, it needs to be mentioned that InWEnt began research in the 1990s to develop an appropriate methodology for developing flexible, employment-oriented curricula and training designs. InWEnt's approach on employment-oriented modular curricula design is now named "Modules of Employable Training" (MET).

TVET teachers should be prepared to apply methods of Modular Employment Oriented Curriculum Development.

## Fundamentals of Modular Employment Oriented Training

In reforming vocational education and training in both developed and developing countries, the introduction of competency-based training systems with a modular type of delivery is believed to offer the best solutions to the problems indicated above. This is because, modular based vocational education and training **facilitates flexible delivery** and optimises curricula utilisation under **demand-driven employment oriented aspects**. It supports cost-effective skill upgrading for existing workers, **training and retraining of youth and the unemployed**, and emphasises **employability** to ensure that training matches the skill requirements of industry and small businesses in urban and rural areas. In addition, it also supports self-paced

learning, promotes effective training at institutions, and on-the-job training.

The two main intentions of a modular VET approach are

- consistent employment commitment
- optimised addressee-oriented qualification.

The consistent employment commitment should ensure that

- curricula/ Modular Training Packages (MTP's) are based on employment realities
- curricula/ MTPs find acceptance on the labour market
- the participants will receive job opportunities and/or employment chances.

The optimised addressee-oriented qualification should lead to a personality development of the participants, a requirement of modern industries and services.

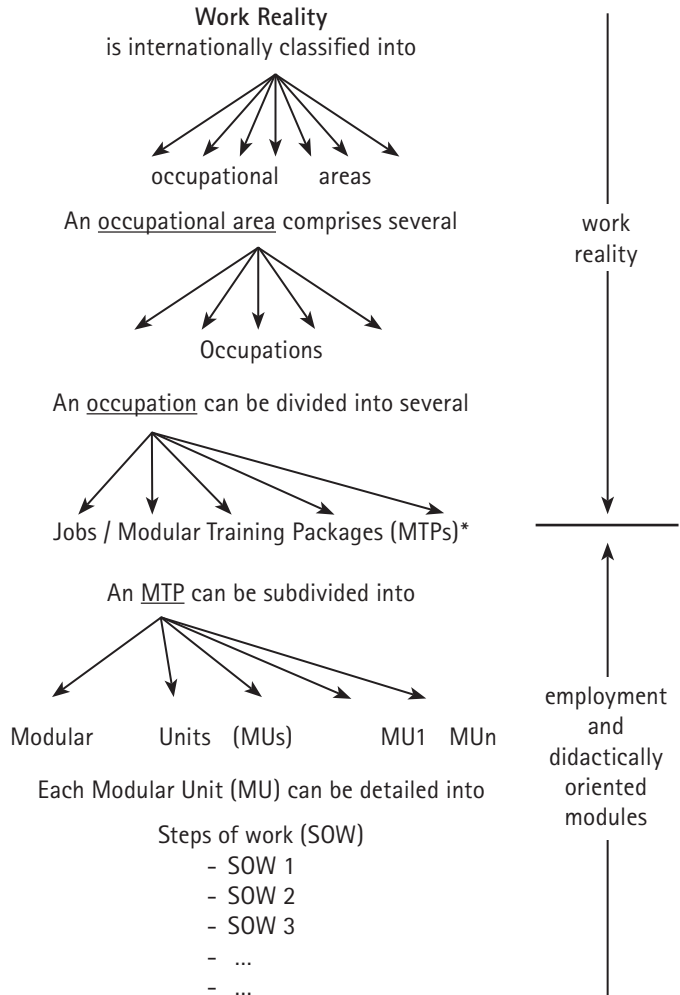
This can be achieved by

- integrating their experience, their potential. and their wishes and perspectives
- self-recognition of clearly formulated and practice-oriented aims, and
- by optimising learning conditions (learning sites, media, methods, contents, etc.)

If one is developing employment – oriented modular training packages, a specific terminology is required, as shown in the following figure:

## Terminology Scheme Concerning the Differentiation of Work Reality and Employment-Oriented Modular Curricula/Training Packages

Concerning occupations and qualifications the complexity of



\* Jobs and MTPs are interrelated! An MTP comprises all necessary information to qualify individuals in a corresponding job / functional area.

## **Main Characteristics of the Modular Approach:**

**The European Center for the Development of Vocational Training (CEDEFOP)** refers to the benefits of a modular approach as follows:

- Modules are temporary and rather easily implemented teaching and learning units;
- Modules are fixed units and directly usable for different educational purposes and contexts;
- Modules do not have to be in a special order; and
- Modularisation has certain consequences for the structure of a curriculum.

In the debate concerning the benefits of modularisation, some central issues concerning its usefulness for certain categories of beneficiaries are common to those of the MET concept and its characteristics as described in the following:

- Trainees with different levels of experience can enter the modular training programme at the stage which is most appropriate for them – that is ,flexible entry/exit'.
- Trainees who are quick to learn, or already have some specific job experience, may be able to skip some of the modules, thereby cutting down the total time required for the programme. Special tuition or self-study (learner-based) programmes may be used to help trainees skip certain modules.
- Trainees who drop out of the modular approach prematurely can receive a certificate or skills passport which states clearly what qualifications they have. This certificate or skills passport will give them a better chance of obtaining a job than a trainee of a traditional course who drops out, because the flexible entry/exit structure of the modular approach enables the trainees to re-enter the modular training programmes later, at an advanced stage.
- Prolonged periods of absence or learning problems in specific fields can be remedied by repeating the relevant module. Instead of dropping out, trainees can improve their knowledge in that field.
- Before entering the modular approach, trainees are requested to take an entry test to check their knowledge and skills in order to ensure that they enter the appropriate module. This allows the determination of the optimal training stage, the possibility of reducing training time, and improving the cost-effectiveness

of training programmes.

- The modular approach embraces the use and/or adaptation of existing appropriate training materials and trainee-centred learning modules that allows for a high degree of self-paced learning.
- Learning places are no longer traditional workshops or classrooms, but become a hybrid facility containing practical areas or learning stations, learning resources and study places.
- Experiences in several countries show that the modular systematic approaches in re-training programmes are extremely effective and efficient. The average pass rate for all re-training courses is around 90%.
- Social partnership is a key element of the systems approach to MET implementation, in order to ensure employability and work for decent jobs.

## Introduction to the Systematic Approach to Modular Employment-oriented Training (MET) Concept

As noted above, the initial step of developing MTPs concerns every day 'work reality'. All the key characteristics and principles of modular training described above are included in the Modular Employment-oriented Training (MET) methodology and include the following inter-related processes:

- (1) Macro and micro training needs assessment and identification of jobs for training interventions
- (2) Modular employment oriented training design applying a systematic approach
- (3) Training delivery based on the core principles of developing skills and qualifications in order to increase the employability<sup>3</sup> of a person.

The basis of the MET approach is a thorough analysis of the actual skill and qualification requirements within a given occupation. Such an analysis is aimed at "what the worker actually needs to know in order to obtain gainful employment at an appropriate level in a sector, community, or occupation". The analytical employment orientation focuses on the current employment situation and training needs assessment of a trainee target group(s) or individual. It essentially covers an assessment of their current skills, knowledge, and abilities, followed by an analysis of any shortcomings and/or gaps in reference to the job's requirements. Therefore, before entering

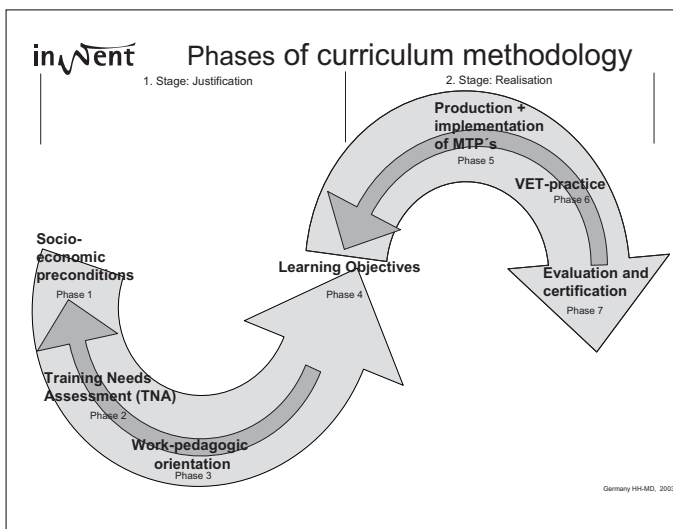
a modular training programme, trainees are asked to take an entry test to check their knowledge and skills in order to ensure that they enter the appropriate module. This allows determination of the optimal training stage, and the possibility to reduce training time and improve the cost-effectiveness of training programmes.

With regard to MTPs, work reality is classified into different occupational areas. The occupation itself can be subdivided into jobs with the status of semi-skilled workers. The approach concentrates primarily on the qualification for jobs.

A qualification for a job makes certain training materials necessary. These training materials are covered by a MTP.

The switchover from jobs to MTP's is important because one leaves the daily working environment and the didactically oriented area of MTP's. Subdivisions of the MTP's are the modular units (MU's). Didactical design, testing etc., are located on the level of MU's. The MU's themselves can be split up into Steps of Work (SOW).

The figure below gives an overview on the phases in the methodology of curriculum development following InWent's "Modules of Employable Training" (MET):



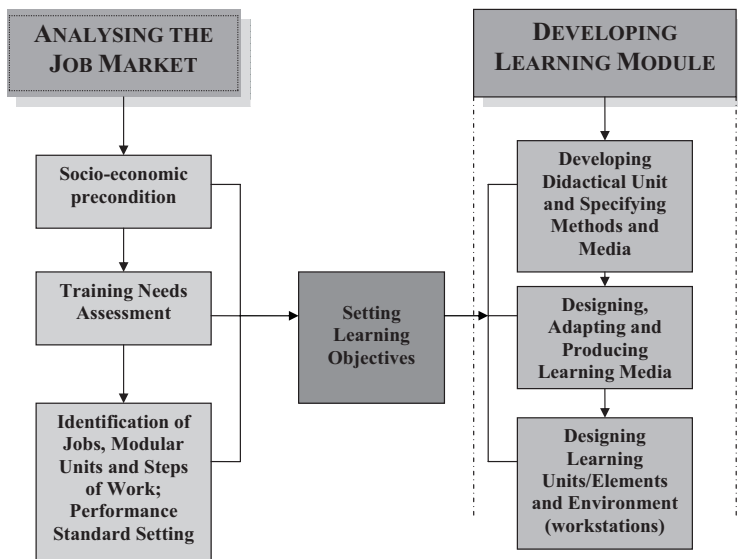
On the following page, a flow diagram illustrates the overall MET design process:

## Two Major Components in Designing Modular Employment Oriented Training Packages

As a result of the above design process, a modular employment oriented curricula with relevant trainer and/or learner-based training, is designed and compiled into Modular Training Programme or Package (MTP).

### Designing Modular Employment Oriented Training Packages

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- <sup>1</sup> Declaration of the European Ministers of Vocational Education and Training, and the European Commission, convened in Copenhagen on 29/30 November 2002, to enhance European cooperation in vocational education and training
- <sup>2</sup> A fair globalization–The role of ILO; Report of the Director General on the World Commission on the Social Dimension of Globalization; International Labour Office Geneva 2004, (ISBN 92-2-115787-3)
- <sup>3</sup> Employability relates to portable competencies and qualifications that enhance an individual's capacity to make use of the education and training opportunities available in order to secure and retain decent work, to progress within enterprise and between jobs, and to cope with changing technology and labour market conditions, ILO HRD Recommendation 195.



Eberhard Trowe

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# In-service TVET Teacher Education and Training for Sustainable Development

## Introduction

In October 2004 a UNESCO conference was held on sustainability of TVET in Germany. Part of the conference involved a review of the initiatives begun at the Second International Conference on Technical Vocational Education held in Seoul in 1999.

This review expressed that moving towards the goal of sustainable TVET development requires fundamental changes in human attitudes and behaviour, in both community activities and on the job.

The preamble to the recommendations set out in the final report stated:

"We have considered the emerging challenges of the twenty-first century, a century that will be an era of knowledge, information and communication. Globalisation and the revolution in information and communication technology have signalled the need for a new human-centred development paradigm. We have concluded that Technical and Vocational Education (TVE), as an integral component of lifelong learning, has a crucial role to play in this new era as an effective tool to realize the objectives of a culture of peace, environmentally sound sustainable development, social cohesion and international citizenship." (UNESCO 1999 Final Report Seoul)

In the interest of sustainable development, achievement, and the competitive ability of young people, the whole TVET system has to be oriented toward the labour market and the employment system. Vocational schools – as partners in training for businesses – make an essential contribution to the qualification of these young specialists. Vocational schools must react to changes in the system of vocational training rapidly, by being able to readjust to optimum functionality. To always be

technically and methodically up-to-date in in-service teachers Training is one of the most important tasks of the TVET System.

Teachers at vocational schools play a key role during this permanent modernization process. The modernization of their qualifications, both in the university studies and continuous professional development, is of high importance for the achievement and future ability of vocational schools, and therefore of the education system as a whole.

Innovative advanced training strategies for vocational school teachers are directed therefore towards vocational-didactical competence development, and the promotion of the development of a young person's personality.

Vocational didactical competences of TVET teachers have different dimensions, e.g. in-service education and sustainability.

This paper concerns the "International Cooperation" of teachers as one part of in-service education.

National systems of in-service education include, among other things:

- Vocational competence adaption
- Professional field competencies
- Competencies creating a suitable learning environment
- Promoting communicative competencies

But sustainable development needs international cooperation and partnership based on communication among specialists.

International cooperation between occupational schools teachers could contain the following two ranges, which should, according to our experience, be integrated into the national concepts of advanced training for teachers:

### **Structure and Work with International Networks**

Knowledge transference is often limited to number of personnel and institutional circles. On the national or regional level, there are usually well functioning networks in which vocational school teachers continuously cooperate. International networks as an instrument of competency development are however still an underused resource. Key positions in the network of the teacher in-service training could be

implemented to assist in this process.

### **Finding and Maintaining International School Partnerships**

Economic globalization makes internationalization of vocational training indispensable. Services, products, and partial components are increasingly, produced, bought, and sold world-wide. Knowledge has no borders. Technical innovation must prove more mobile, flexible, and international than ever before. To facilitate this, international school partnerships are becoming an important issue. In particular, teachers can arrange creative partnerships. Therefore they need intercultural competencies, language skills, and a desire for international cooperation.

Vocational schools have to work satisfactorily in international competition, carry out integration and innovation, and offer special products, which lead to the acquisition of skills usable for a specific work environment in a specific region. School partnerships are particularly effective in adapting education products and methods, for comparing and improving the standards of education.

Work within international networks concerning TVET and the cultivation of international school partnerships are two indicators for a sustainable modern education, which contribute to the advancement in national education systems.

Learning to use these systems is important for teachers in their in-service training. The focus on maintaining a teacher's abilities has to be extended from specialized structured knowledge education to internationally oriented thinking, based on the reality of work, which is changing all the time.

Practice-oriented thinking, acting, searching and co-designing, are critical for the vocational field, and contribution to sustainability, if it they are connected with real business practices.

In the context of didactical competence development, which is necessary in the teacher's continued professional development, teachers have to pay attention to the personality development of their respective target groups.

The promotion of the students' personality development by teachers is directed towards the perception of responsible acting. This includes environmental awareness and requires technical knowledge of complex circumstances.

InWEnt supports advanced teacher training, which is directed towards the integration of principles of a sustainable development. The projects contain contributions to improving the quality of education. These contributions refer to the integration of

practical examples:

- Use of connections between theory and practice
- ICT-based multimedia solutions
- International partnerships between schools
- Cross-linking of teacher advanced training centres to promote the exchange of experiences. This means promoting networking.

As an example I would like to present an advanced teacher training project, which is now running in cooperation with the Ministry of Education of China.

**The starting point** for cooperation with InWEnt in the area of advanced teacher training is:

The need of highly qualified technical and management personnel, who are able to handle modern technologies, be innovatively active, and recognize environmental problems in production, which is always a factor.

The parameters of China's economic development were assessed. Within these parameters the quality of education must be improved with simultaneous attention to the principles of sustainable development.

**The goals of the advanced teacher training project** were determined from this starting situation through the cooperation of professional colleagues:

900 vocational school teachers have to be qualified and prepared within the frame of these economic parameters. They will then disseminate this knowledge during their professional career activities.

Measures have to be introduced, which are oriented towards state of the art knowledge and contain methodological expertise. The main point is to contribute to didactical competence.

The following goals were agreed upon:

- Intervention and training of action-oriented methods for vocational school

education

- Technical continuous professional development
- Transfer of valuable experience
- Knowledge of training practices in businesses and schools, with emphasis on media application.

The project was conceived in **3 parts** according to these objectives:

Part 1: **Preparation in China** that includes:

- Intercultural preparation
- Comparison of vocational training and education systems
- Technical preparation in special questions
- Specialized vocational didactical training as a contribution to improving competencies, and offering participants ideas to initiate changes in their job area.

Part 2: **Advanced training in Germany** that includes:

- Vocational competence adaption – focus on ability:
  - to illustrate, to structure, to simplify complex circumstances
  - interdisciplinary cooperation with other specialist teachers (team teaching)
- **Professional field competencies** – focus on ability:
  - to analyse practice, to justify and explain relations of practice
  - to critically inquiry into praxis
- **Competencies to create a suitable learning environment focusing on ability:**
  - to promote social learning behaviour
  - to organize team-oriented learning situations
  - to orient classroom education towards the reality of work
- **Competencies to promote communication abilities:**
  - to use ICT as a instrument for education
  - to create multimedia solutions, to communicate beyond the classroom, city, and country borders

As one result of this part of the continuous professional development, many teachers found school partners in Germany. They changed curricula, talked about examinations, and found ideas to develop the quality of education (for both the Germans and the Chinese).

### **Part 3: Exchange of experience in learn-communities via Internet**

- Field related information systems for each specialization
- Supply of didactical material, such as teaching plans, handouts, pictures
- Reports of teacher advanced training projects in TVET schools. After returning home, the participants support other teachers (multiplication system)

This can be the beginning of networking between Chinese and German teachers.

In this way, InWEnt – in cooperation with MOE – is trying to help teachers, trainers, and lecturers to adapt to new needs at all levels of TVET.

This transformation necessitates a change from the didactic rote learning to an experiential and facilities approach by teachers and instructors.

The continuous professional development in China and Germany is based on a modular training concept. Training needs were found and described by our Chinese partners, CIVET, in Beijing. Module designing then took place as a cooperative process between German and Chinese specialists. Modules of the continuous professional development are interchangeable. In this way, Chinese participants become highly specialised and can exchange knowledge and experiences. In principle, all modules include technical specialised information and the capacity to transfer new didactical concepts.

In addition to in-service teachers and instructors, education means dialog with administration officials and policy makers, which is also a key part of the InWEnt – MOE Project. About 150 principals of TVET schools, as well as members of different administrative levels in the provinces will be included each year in different measures. Those participants get an overview of TVET and on-site development of personnel.

Training related to their roles in sustainable development must be added to formal institutional preparation by policy-makers and teachers/instructors. The InWEnt TVET management-training programme, running from 2004-2006, in cooperation with MOE at the post-graduate level, focuses mainly on the following elements:

- integration of environmental protection in TVET
- corporate social responsibility
- using ICT in TVET schools
- management of TVET Institutions

3 levels are involved:

- teachers, trainers, instructors
- principals
- administrators

Together, the different target groups will be able to positively effect sustainability TVET.

For further information please see the following article by Wu Quanquan.





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**Central Institute for Vocational and Technical Education  
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## **General Survey of a Sino-German Training Project for Teachers of Vocational Education**

### **Background of Project**

To act in the spirit of national working conference of vocational education and carry out Decisions of State Council on Vigorously Promoting Reform and Development of Vocational Education, as well as according to the requirements of reports at the 16th National Congress of the Communist Party of China of "bringing up numbers of high-quality workers" and based on the instruction of leaders of Ministry of Education on strengthening cooperative work of foreign exchanges of teachers in vocational technical schools and initiating the project of cultivating skilled talents for the manufacturing industry and modern service industry, Ministry of Education, People's Republic of China and Capacity Building International (InWent), Federal Republic of Germany have cooperated to carry out the "Sino-German Training Project for Teachers of Vocational Education" from 2004 to 2006.

The main objects of the project are professional teachers in the state, provincial and ministerial level key vocational schools as well as training bases for teachers of vocational education. The 3-year project has selected and recommended 900 backbone teachers of vocational education in 6 specialties, including application of numerical control technology, application of mechanical and electronic technology, application and maintenance of automobile, application of electronic technology, international commerce and tourist management and service, to attend the training in Germany as the visiting scholars of vocational education. The Chinese and German experts of vocational education formulate the specific training courses in combination with the actual demands of the development of Chinese economy and vocational education as well as the professional level of teachers. The backbone teachers, who are eligible after the selection, receive 2-week domestic adaptability training at first. They attend the 6-week foreign training in Germany after preliminarily digesting and absorbing fundamental contents in the teaching materials. The foreign

training is carried out in German modern enterprises and training institutions that have advanced teaching principles and abundant experience in order to realize the modernity of professional contents. Moreover, the teachers receive the training of professional teaching method of vocational education by means of actual operation and situational teachings. After the training, the teachers obtain relevant certificates jointly issued by China and Germany.

Department of Vocational Education and Adult Education and Department of International Cooperation and Exchange, Ministry of Education are in charge of macro-planning and coordination, and the concrete operating units are Central Institute for Vocational and Technical Education, Ministry of Education and China Education Association for International Exchange. The Central Institute for Vocational and Technical Education does lots of work in some aspects, including selection of chief experts, formulation of teaching programs, development of training courses and coordination of foreign training.

## Significance of Project

Although China and Germany have cooperated in vocational education since 1984, the project is an unprecedented undertaking in a sense, indicating foreign cooperation in vocational education has turned from input-based type to output-based type in respect of form, from passive-receiving type to initiative-taking type in respect of content and will change from supply-oriented type to demand-oriented type in respect of system.

According to the above three great changes and based on the full understanding of the basic ideologies and systems in German vocational education, the emphasis of curriculum development is divided into two aspects: (1) explore how to confirm the new requirements of professional qualification for professional talents in accordance with the development trend of relevant specialties; (2) explore how to confirm the professional teaching theories and methodologies of relevant specialties in view of the vocational education. Therefore, all issues that can be solved in China must be solved through the adaptability training in China. However, the trainings that will be received abroad must be conducted in the selected countries, focusing on helping teachers receiving trainings achieve great breakthroughs both in terms of method

and idea by really experienced education in order to realize the comprehensive configuration and integration of educational resources both at home and abroad. The achievements of nearly 40 teams completing the training show that the implementation of this project has active meanings for promoting the establishment of teacher teams in China and improving the professional level of teachers. The specialties included in this training project are all greatly needed for China's modernization and comprehensive construction of a well-off society. At present, the skilled and technical professionals of these specialties are far from sufficient, both in quality and quantity, to meet the demands of the development of China's economy. Germany's experience and approaches on fostering the teachers of vocational education are well applauded across the world and the above specialties are the advantages of Germany. Therefore, Chinese backbone teachers of vocational education, through the training in theory and practice in German modern enterprises and vocational schools, are bound to fill gaps in teaching concepts, development approaches, professional techniques and media-based instruction of current teacher trainings in China to a certain extent so that a certain proportion of backbone teachers will directly benefit from the training. Once the project ended, the teachers who have received the training will adopt similar approaches and courses contents to set up training programs in a larger scale to promote the achievements of project in the whole country, thus creating a new model for the cooperation with world strong countries in vocational education in a new era.

## Achievements of Project

The teaching activities of each professional teaching site are guided by the actual demands of Chinese teachers of vocational education in terms of general arrangement; the teaching activities take the teaching of professional teaching theories as the cardinal line in terms of teaching contents, spreading advanced principles of vocational education to Chinese teachers; the teaching activities are based on the implementation of project teaching in terms of teaching methods, completely showing the features of German vocational education. The teachers in each specialty find that they have learned a lot in terms of teaching theory and professional skill.

For instance, the earnest and responsible working attitude impressed the Chinese teachers greatly during the teaching for the specialty of application of electronic

technology. The teachers, in particular, found everything new and fresh in the professional teaching methods from the very beginning. The visits were also arranged in the teaching process. The teachers successively visited several companies and organizations, including Cologne Germany Educational Exhibition, Adam Opel AG, Opel Training Center, Hassia Mineral Water Beverage Company, Darmstadt Enterprises Association Training Center, Handicraft Industry Guild of Rhein-Main Region and Bonn Germany Federal Central Institute of Vocational and Technical Education. The teachers visited Groß-Gerau Vocational School in the opening day, having viewed and emulated the classroom instruction of "learning field one" courses of electronic technology by aiming at the Germany new course plan of "learning fields".

Through the training, all teachers had a better understanding and sensible knowledge on curriculum models of "learning fields" and "action-oriented" teaching models in Germany. The teachers found that these achievements could play a guiding role in their future educational teaching work, having great influence for reference on educational and teaching reforms of each teacher's school. At the same time all teachers also benefited a lot from the recessive learning factors contained in this project. The teachers understood that they should look upon the individual differences of vocational education targets from a scientific point of view; the thinking modes of students in the vocational education system mainly depend on visual thinking; what are important in the curriculum reform of German "learning fields" are to face this reality; the principle of vocational education is to start with each link and procedure of working process to divide different action fields and to use action-oriented methods to conduct "vocational" trainings for students. The vocational education should lay stress on action, instead of abstract formula derivation and trivial theoretical examination. Only in this way, can high-quality workers be cultivated. For instance, according to the continuous expansion of German vocational training contents with the development of new technologies, the teachers understood that since the adaptation of vocational education to changes of the economy, society and technical labor organizations is the basic rule that the reform of vocational education must abide by, the flexibility of containing new technologies and new professions should be taken into consideration in the construction of vocational education system. The teaching reform of vocational education in our country should not only draw on the abundance experience of Germany in this respect, but also make efforts in the basic level to continuously enhance the educational and teaching reform in the attitude of absorbing and drawing on all excellent achievements of world

civilization, on the basis of careful researches on German experience of vocational education, in combination with the actual situations of our country, and aiming at actual situations of each school.

To sum up, we can see from the harvests of teachers with the specialty of application of electronic technology that the 6-week foreign training clearly shows the momentous meanings of Sino-German Training Project for Teachers of Vocational Education. In general, the teachers believe that this project is an unprecedented undertaking in the history of development of vocational education of our country; the project will have far-reaching influences on promoting the reform of vocational education of our country and lay a foundation of personnel for deepening the reform of vocational education of our country, making full reservation of human resources.

For instance, the main harvests of teachers with the specialty of application and maintenance of automobiles show in the following aspects: (1) They have a better understanding in terms of professional knowledge, including electrical and electronic engineering of automobile and mechanical maintenance of engine, having improved their abilities in precisely reading automotive circuit diagrams. They are provided with cases helpful for their effective teaching of professional basic courses in future teaching, having obtained lots of favorable inspiration from the teachings of German instructors. At the same time, they have new breakthroughs in the knowledge including the structure principles and test methods of electric control diesel engines and common rail diesel injection systems, having had a better understanding on the actual situations and development of foreign diesel engine saloon cars. (2) In terms of teaching contents, the teachers think that the teaching contents of German vocational education can basically keep pace with the technical development and have strong practicability; the teachers put stress on the participation of students in teachings and the teaching methods were used suitably; the teaching materials lay stress on the combination of cultivation of special skills and production practice; they were enlightened by these features and thought these features would have great referential functions on the fact that the teaching materials of vocational education in our country far drop behind the actual situations of production. (3) In terms of teaching modes, the teachers were greatly impressed by the small-class teachings and multimedia instruction in the teaching of German vocational education. They thought the teaching principle of visual thinking of German vocational education and action-oriented teaching methods would be the topics worth the careful research and

practice. (4) In terms of teaching evaluation, the teachers had a new understanding on the evaluation standards and ability cultivation of German vocational schools. Its representation is as follows: with the rising requirements of enterprises for quality and ability of professionals, the professional skills have not been the single target reflecting the abilities of students. The teachers should help students obtain reciprocal key abilities in order to utilize professional skills in the work and fully exert their functions. (5) In terms of teaching facilities, the teachers were also greatly impressed by the ample experimental facilities, high equipment capacity factor and complete safety devices of German vocational schools and enterprises.

In the training process, the teachers, through relevant visits and surveys, have acquired some intimate knowledge in several aspects, including curriculum provision, teaching process, examination, level of teaching staff and school management of German organizations of vocational education, having gained visual experience on product lines, production management, and products of German enterprises.

# Virtual Learning Infrastructures for Process-Oriented Qualification of Teachers and Trainers in Germany

## Definition: What does Virtual Learning Infrastructure Mean?

Virtual Learning Infrastructures (VLI) are opportunities for formal and informal e-learning, aimed at special target groups. The structure of VLIs is based on three objectives or content areas: information (e.g. newsletters, wikis), communication (e.g. forums, communities) and learning materials (e.g. special learning programs, virtual classrooms).

The basic content in VLIs is developed at first by groups, which are mostly publicly financed. During the life cycle of VLIs the users contribute and develop new contents step by step under a content management system.

In this paper I would like to present two examples of VLIs. Both examples are intended for the teaching staff of VET. However, according to the Dual VET-System in Germany, we have two main groups of teaching staff: trainers for the initial and continuous professional development in businesses, and teachers for vocational part-time schools.

### Formal and Informal e-learning

We distinguish formal and informal e-learning based on the differentiation of formal and non-formal learning by ARING/BRAND <sup>1</sup>.

Formal e-learning is:

- locally-bounded (i.e., you need a classroom or a similar learning environment)
- bounded by time-management (i.e., this learning sequence is integrated in a schedule, planned by teachers)
- guided by teachers or trainers (i.e., the learning process is organised by teachers, based on a curricula)
- didactically prepared and explicit (i.e., the learning process based on special methods and media use, and guided by objectives)

- registration and certification (i.e., students need a special entrance level, and the courses are usually completed with an examination and certification)
- mixed with various forms of learning (i.e., learning sequences like lessons, practice phases, etc, are also part of the learning process)

Informal e-learning is

- limited only by access to a computer and the internet (i.e., you will need a "login" near your workplace)
- usable all of the time (i.e., it is not bounded by, and independent of, a schedule or an organisation)
- self-guided by learners (i. e., responsibility and decision for progress is up to learner)
- without structure (i.e., it is not a guided tour, you can operate freely in hyperspace)
- wide-open, on demand (i.e., the impulse for use derives from circumstances – situation, problems, and questions.)

Informal e-learning is increasingly an important instrument for

- improving competence within a working process, and
- for individual follow-up of formal learning processes

### **Process Competence and Online-Communities – Supported by Informal e-learning**

Formal learning, and formal e-learning are suitable for imparting basics. Informal e-learning is suitable for the development of process competences.

Process Competence means, on the one hand, the ability to direct the proceedings, especially in output-oriented procedures (in the context of a business enterprise); on the other hand, the optimizing and changing of processes is possible by those involved.<sup>ii</sup> Process competence is not only important in output-oriented production; it is just as important for output-oriented teaching and learning for both teachers and trainers.

Virtual learning infrastructures are learning environments based on the Internet or Intranet, which enable formal and informal e-learning. These various elements are integrated and support communications, information gathering, and actual learning. Formal e-learning virtual classrooms are available through various professional suppliers but also as an open source software. "Virtual Classroom" is a software tool for creating synchronic networking. Virtual classrooms are team-oriented. In contrast to virtual classrooms, computer-based teaching material tends to be oriented toward the individual. Other tools are simulation software types that may, for example, demonstrate technical processes. Computer based teaching material,



simulation software, as well as manuals, online papers, and journals can be used by teachers and trainers in formal learning setting, which are also integrated with other learning elements.

In contrast to formal learning procedures, virtual learning infrastructures offer opportunities for informal process-oriented learning. Typical elements of virtual infrastructures are wikis, forums or panels, bulletin boards, mailing lists, link lists and search machines.

Learners will use these elements on demand, which is implicit in working processes. In the process of communication between single users, they tend to create so-called online communities.

Online-communities are informal groups or networks, which are based on common interests, problems, and challenges. The idea is to collaborate, exchange experience and knowledge, in order to create new and more useful information over a longer period of time.

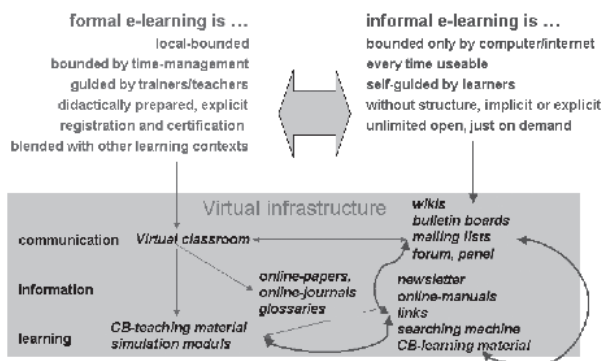
### Formal and Informal e-learning in Virtual Learning Infrastructures

Communication processes will be stored on the virtual learning infrastructure. That is why virtual learning infrastructures linked with online communities are important instruments, not only for learning but also for knowledge management.

So the benefit not only goes to the user, but also to institutions and organisations that supply virtual learning infrastructures.

The relationship between formal and informal learning and VLIs is shown in graph 1:

Graph 1: formal and informal e-learning in virtual infrastructures



In the last eight years in Germany, the development of virtual learning infrastructures

has been promoted by publicly sponsored pilot projects and private initiative. In the field of VET, the most successful example is that of virtual learning infrastructure for apprentices, skilled workers, and technical experts in the area of media development (<http://www.zfamedien.de/>). At the moment we are engaged in developing a VLI for electronics. The number and size of VLIs is increasingly permanent. Especially for training staff, there are two VLIs available, which I would like to introduce below.

### Comparison: Foraus.de// Lehrer-Online: two examples – some characteristics

As in Germany, the dual VET system and initial training is conducted by teachers and trainers at independent businesses in conjunction with VET schools.

A VLI for trainers is found under [www.foraus.de](http://www.foraus.de). BIBB and partners have been developing this in the last five years (started in 2001).

Foraus.de has got the following elements of a VLI (graph 2).

Graph 2: (un)used elements of VLIs at foraus.de

The screenshot shows the homepage of foraus.de, a portal for vocational training. The website layout includes a top navigation bar with links like 'Bücher / Medien', 'Tipps zur Ausbildung', 'Aktuelles', 'In eigener Sache', and 'Redaktionen'. A central banner features a photo of two people and the text 'Willkommen in foraus.de'. Below this, there are sections for 'KNOXLEGEBORE', 'AKTUELLES', and 'BÜCHER / MEDIEN'. On the right side, there are links to 'BIBB', 'Arbeitskreis', 'Forum', 'Newsletter', and 'Suche'. Annotations with arrows point to various elements: 'wiki-bulletin boards mailing lists forum, panel' points to the top right; 'Newsletter online-manuals links searching machine' points to the right side; 'Virtual classroom' points to the 'Arbeitskreis' section; 'CB-teaching/learning material, simulation modules' points to the 'Suche' section.

The most important challenge in the context of foraus.de is to meet the interests of users and to integrate the users with the VLI. The result should be an Online-Community. It needs "traffic" on the VLI, because without traffic there is no communication, without communication there is no news, and therefore no new content. It is like a life-circle.

An obstacle in this context are the regulations of BIBB authority in the German VET-System. As we are an official institution, trainers may be inhibited in their user behaviour and in bringing up questions, opinions, and problems. Nevertheless the number of users is increasing.

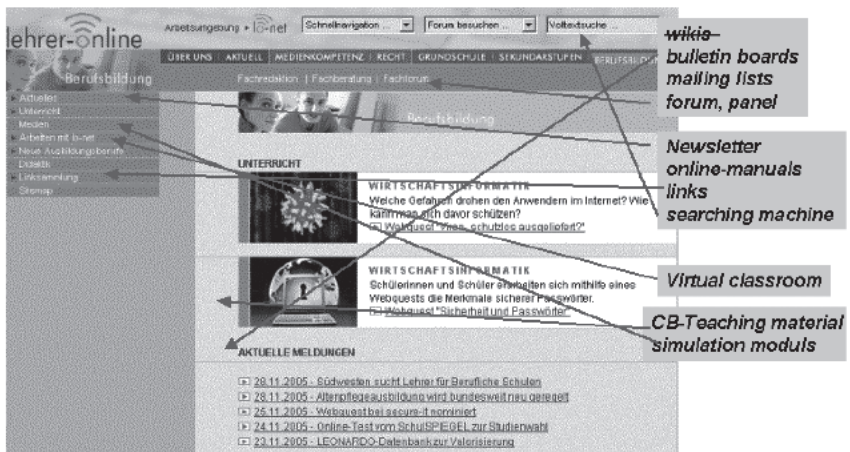
Teachers are the second group of training staff in the VET-System. For them, www. Lehrer-online.de is the most suitable website.

This VLI is a joint project of the German Federal Ministry of Education and Research and Deutsche Telekom. It is based on a larger initiative known as "Schools Online", founded in 1996. More than 70 experts work permanently on this project, compared with foraus.de, where there are only about 5 part-time jobs involved.

So 'lehrer-online.de' is more differentiated in reference to single groups and topics according to school types, subjects, media, etc.

The homepage of www.lehrer-online.de demonstrates this diversity (graph 3).

Graph 3: (un)used elements of VLIs in lehrer.de



For comparing both VLIs, five criteria were used: target group, content, formal and informal use, hits per month, financing (table 1).

Table 1: Comparison Foraus.de versus Lehrer-online.de

A lot of Lehrer-online's content has been developed by users, for example, small CBTs, transparencies, learning materials, and curricula.

However, forum discussions have rarely been used in VLLs. This is a handicap for the

	Foraus.de	lehrer-online
Target-group	trainers of enterprises and inter-enterprise training centers	Teachers of all school-types (primary school → VET-school)
Content	more general, unspecific, focus on pedagogical and organisational topics	differentiated according to special groups subject-oriented
Use (formal/informal e-learning)	more informal  free of charge	Both, also for blended learning by teacher-trainings  free of charge
Hits per month		380.418 (general) 97.209 (VET-teacher)
Financing	by public bodies (BIBB, Federal Ministry for Education)	public private partnership (by German Telekom and Federal Ministry for Education)

community-building. Without large external support both VLLs cannot currently run. Consequently - not only for these VLLs - the conditions for process-oriented informal e-learning are very important.

### Conditions for Acceptance and Use of VLLs – Chances and Obstacles

In Germany the informal use of media and computer-based communities by students, and teaching staff have been examined. Here are some results that characterise the German situation:

One can observe an increasing use of ICT. In the past five years, roughly 90 % of all youngsters (14-19 years) in Germany have used the Internet.<sup>iii</sup> 95% of young people use the Internet in their qualification-process. This shows the positive correlation between ICT-use and its application in the qualification processes.

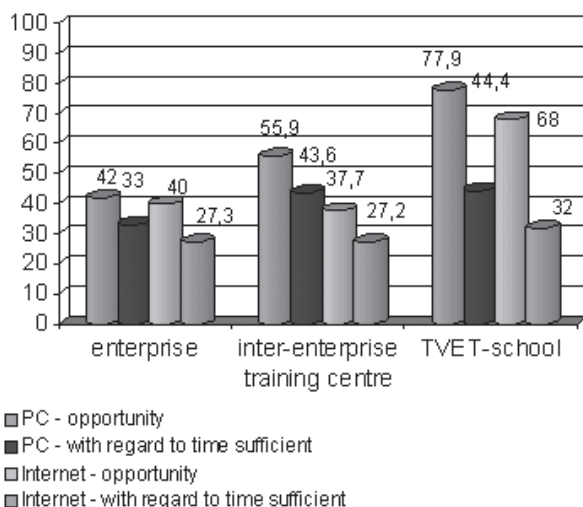
Roughly 50% of young people use the internet to search for information in the field of education and science, as well as for hobbies, leisure time, and cultural activities (58% 20-29 years, on average 47%).

A central address in this context is "Der Deutsche Bildungsserver" ([http://www.eduserver.de/index\\_e.html](http://www.eduserver.de/index_e.html)).

For school exchanges, the following address is important:  
<http://www.schulweb.de/en/faq/index.html?anzeige=m&kategorie=faq>.

More information is given under the URLs mentioned above.

Another example for the more informal ICT-usage in initial training, is provided by a study that was conducted by BIBB in 2005.<sup>iv</sup> This study deals with electronic, electro-mechanical, and ICT-oriented initial training in the craft/service sectors. The best opportunities for self-organised ICT-use appear to be provided in TVET-schools (see graph).



Graph 4: Opportunities for self-organised ICT-use by apprentices and institutions

Looking at formal offers for continuous professional development and education, the financing and participation has decreased in recent years. Publicly-supported continuing vocational education and training for disadvantaged target groups (SGBIII-geförderte Maßnahmen) has also been reduced. The number of participants in continuing VET-examinations has steadily dropped from 1992 to 2003 (1992: 171,135 participants - 2003: 125,467 participants).<sup>v</sup>

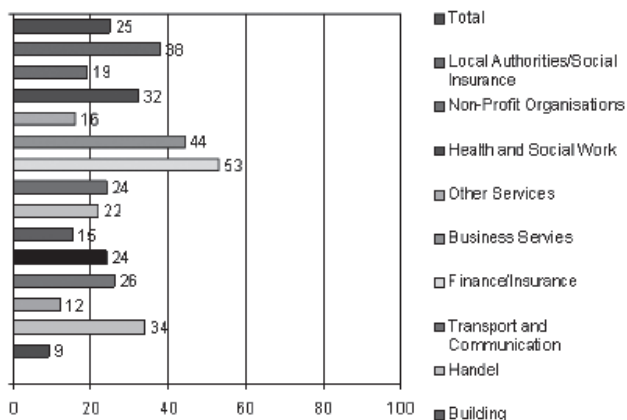
In the field of distance learning the situation is similar. ICT-use in the field of distance learning offered by distance-learning providers is low, only 4.5% of traditional

courses include e-learning modules. However, 47.7% of providers will use e-learning modules in the future.<sup>vi</sup>

The situation in further training programmes offered by training institutions, or in-house training at private firms, appears to be similar, and much depends on the individual initiative of trainers. E-Learning-campaigns by groups such as Dresdner Bank, BMW, Volkswagen, or other firms were not so efficient and have, after a relatively short euphoria, levelled out.

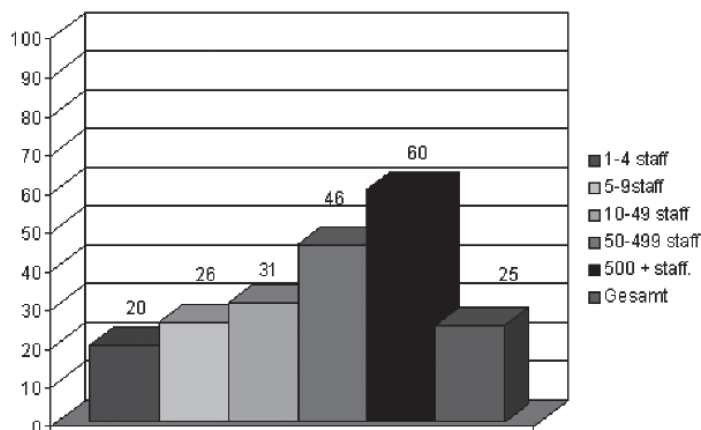
The ICT-use in companies has risen only slightly between 2001 and 2003. According to a study carried out in 2001, roughly 46 % of enterprises with more than 1,000 employees used e-learning. Again only 18.4% of their employees benefited from ICT. ICT-use was planned by more than 25 % of large enterprises.<sup>vii</sup> A later study, carried out 2003, reveals the change: 60% of firms with more than 500 employees were using e-learning. According to a periodical questionnaire carried out by BIBB/IAB, only 25 % of the businesses questioned were using e-learning programmes.

There is also a correlation between the frequency of ICT-use and various types of business.



Graph 5: Correlation between the frequency of ICT-use for learning and different type of businesses.<sup>viii</sup>

Another correlation is given by the number of employees per company. Employees in small and medium enterprises are disadvantaged compared with bigger enterprises.



Graph 6: Correlation between number of staff in firms and frequency of ICT-use<sup>x</sup>

With regard to e-learning in relation to other workplace features, the following findings can be noted: establishments that are technologically innovative make more use of PCs and the Internet for continuous professional development in VET than those which are less innovative. This is particularly apparent when e-learning is considered in association with investment in information and communications technology (ICT). 41% of firms investing in ICT reported that they supported e-learning, whereas only 18% of these firms did not invest all in this area. A similar correlation can be identified between e-learning and more advanced technological facilities (as assessed and reported by the establishments themselves). Of the establishments that consider themselves equipped with state-of-the-art technology, 36% use PCs and the Internet for continuous professional development in VET.

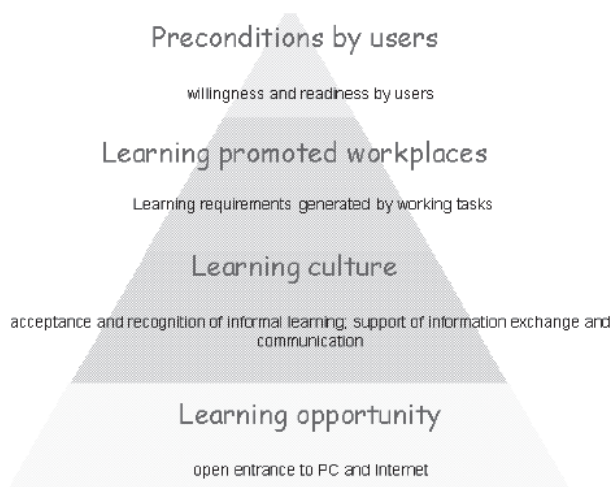
Finally, the results of the IAB Establishment Panel survey also show a correlation between the use of e-learning and the involvement of establishments in initial vocational training. E-learning programs are more frequently offered by training establishments (35%) than by firms not providing any initial vocational training (21%) – either because they are not entitled to, or because they choose not to, despite being qualified to do so.

Enquiring further into the ways in which workplaces use PCs and the Internet for continuing VET, the following picture emerges:<sup>x</sup> e-learning is most commonly delivered by offering access to self-study materials and learning platforms (on average 49%, in large firms 66%), and by combining it with other ways of education

and training (39%). In 12% of establishments surveyed (large firms: 25%), learning time agreements have been reached, either in work contracts, or by informal arrangements between employees and their personnel managers.

To summarize, there is a differentiated situation depending on various conditions and demands.

These conditions can be clustered into four levels or topics (graph 5).



Graph 7: Preconditions for using VLIs

The first condition is the simplest, but not offered everywhere. According to a questionnaire carried out in spring of 2005, nearly all trainers (ca. 90%) have internet-access at their workplace. The situation appears to be similar with teachers: all schools are equipped with computers and internet.

The second condition is the learning culture inside of institutions and businesses. 'Learning culture' describes the acceptance, recognition of, and opportunities for, learning within an organisation, which includes the efforts exerted by organisations and individuals to improve skills and expertise. Only about two out of three trainers use internet and a computer in their teaching routine. The range of ideas and opinions concerning ICT is long: on the one hand you will find absolute rejection, on the other hand there is a creative and innovative behaviour related to ICT-use.

For schools there is also a differentiated situation; for example, by subjects (Table 2).



Table 2: Ranking of ICT-use (Internet) in TVET Schools <sup>xi</sup>

Frequent use and occasional use			Frequent use
86 %	information technology	information technology	82 %
80 %	German language	commercial subjects	48 %
77 %	social science	technological subjects	43 %
76 %	foreign languages	project learning/teams	27 %
75 %	mathematics	labour, economy, technology	26 %
71 %	natural science	natural science	19 %
60 %	project learning/teams	social science	17 %
60 %	technological subjects	foreign languages	17 %
51 %	labour, economy, technology	mathematics	16 %
51 %	commercial subjects	human services	14 %
41 %	religion/ethics	Local history	12 %
32 %	human services	German language	12 %
30 %	local history	arts, music	6 %
27 %	arts, music	religion/ethics	3 %

The chart above only offers an indirect indicator for the current learning culture at training institutions, and may offer some explanation for the resistance many teachers and trainers have to new media. Further, it can be maintained that there is a relationship between learning culture and working conditions.

That is why the third cluster is called 'learning promoted workplaces', i.e. the demands to learn brought about by circumstances and content in the work place. It is not always easy to motivate teachers and trainers to use innovative methods. One of the hardest tasks for the head teachers is it to guide this processes. Both the 'learning culture' and 'learning promoted workplaces' are the most difficult conditions needed to establish the use of VLLs.

Lastly, there is the fourth cluster: "Preconditions by users", i.e. the willingness and readiness to use VLLs and new media. Results of our studies show that the students are usually better prepared than the trainers.

## Summary

In Germany we have some experience in VLIs for the training of teachers and trainers. It is important that there are not only formally organised e-trainings or mixed learning forms. For continuous professional development, informal e-learning is relevant. Its establishment depends on certain structural conditions.

- i Aring, Monika/Brand Betsy: The Teaching Firm. Report of pilot study funded by US department of labor, 1996, S. 16 f.
- ii Bahl, Anke/Koch, Johannes/Meerten, Egon/Zinke, Gert: What does it mean to provide process-oriented training? In: Berufsbildung In: Vocational Training in Research and Practice Special Edition 2005, S. 27 ff
- iii vgl. ARD-ZDF-Online-Studie 2005 Download <http://www.daserste.de/service/ardonl05.pdf>
- iv <http://www.bibb.de/de/wlk15520.htm>
- v a.o.s.a.; Page 258, Table 84
- vi a.o.s.a.; Page 257
- vii [http://www.kpmg.de/about/press\\_office/2943.htm](http://www.kpmg.de/about/press_office/2943.htm)
- viii IAB/BIBB-questionnaire 2003 Berufsbildungsbericht
- ix IAB/BIBB-questionnaire 2003 Berufsbildungsbericht
- x The following analysis refers to all establishments reporting PC and Internet use for continuing VET purposes.
- xi IT-Ausstattung der allgemeinbildenden und berufsbildenden Schulen in Deutschland (Bestandsaufnahme 2005 und Entwicklung 2001-2005) published by BMBF, Bonn, Berlin 2005, Download [http://www.bmbf.de/pub/it-ausstattung\\_der\\_schulen\\_2005.pdf](http://www.bmbf.de/pub/it-ausstattung_der_schulen_2005.pdf)

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## **Virtual Learning Community: a New Approach to Teacher Professional Development – Reflective Research into an eLearning Program of Intercultural Collaboration between China and the United Kingdom**

### **Educational Reform and Teacher Qualification in China – Problem Background**

Academic examination, as a social selection tool, has had a long tradition in China. In recent years, K-12 school education in China has been seriously criticized as being overly focused on academic examination. It has caused great public concern over the harmonious and healthy growth of children. A series of reform measures have been implemented to adapt K-12 education to national development.

Over one million in-service teachers in K-12 schools in China play a key role in the social and cultural development of China. The qualification of in-service teachers is a focus of national strategies in China. At the beginning of the new century, the qualification of in-service teachers was adapted from making up deficiencies in academic degrees, to professional development support [1].

Two ongoing reform measures in K-12 education are challenging in-service teachers, and influencing their professional development to a greater degree, namely:

- Adoption of new curricula,
- Fostering ICT application in teaching and learning.

#### **New Curricula in K-12 Schools**

In June 2001, the National Ministry of Education (MOE) issued the Outline to Guide Curricula Reform in Basic Education (Trial). Adopting new curricula was set as the core of educational reform. The educational philosophy underpinning the new curricula for K-12 education can be categorized as the following [2]:

- To aim at whole-personality development of students

- To integrate students' life experience with academic learning as part of the curricula
- To focus on subjective construction of knowledge by students in the teaching and learning process
- To create institutional environments fostering individual characteristics

Because of the key role of teachers, changing the teachers' educational perceptions and instructional patterns is decisive for success in fulfilling the new curricula's requirements. However, such requirements and their underpinning philosophy are unfamiliar to in-service teachers. It is unrealistic to expect teachers to easily dispense with their firmly held perceptions, beliefs, and instructional strategies which have been proven to be effective till now. First of all, the successful teachers would especially have more difficulties with the paradigm shift in teaching and learning.

### ICT Application in K-12 Schools

The rapid development of information and communication technology has changed almost every aspect of personal and social life. K-12 education should set a solid foundation for the coming generation to lead a successful life in the emerging information society. In the year 2000, the Chinese government issued the **Plan to Develop Educational IT in the 10th 5-year Period (outlined)**, which required among other things:

- To set up Information Technology as a separate subject in schools,
- To connect all K-12 schools with the Internet by 2010.

However, a survey conducted in 2003 [3] shows that 90% of all the 20,000 school intranets were at a status of 'being not used or not efficiently used'. Besides other factors, e.g. limited budget, lack of online resources, and deficiency in school management, it is also the teachers' perceptions and competence in ICT in teaching and learning that are obviously a barrier to integrating ICT in K-12 education. ICT competence does not merely refer to CAI, or demonstrating pre-established contents to students, but rather serves to support students' autonomous and collaborative discoveries, communicative learning, and social construction of what has been taught. The traditionally teacher dominated classes have handicapped the effective integration of ICT into a students educational process

### **How to Solve the Problem**

Both educational reform measures described above are interconnected and mutually supportive in improving educational effectiveness. Concerning teachers' qualification, it seems that new curricula challenges a teachers' perception of teaching and learning, whereby integrating ICT focuses more on their competence and skills in the organization of teaching. From the viewpoint of interaction between perception and action, between theory and practice, a shift of pedagogical paradigm is a prerequisite to the realization of a shift from the teacher-centered transfer of knowledge, towards a new teaching and learning culture styled as student-focused, with an interactive construction of knowledge (in reference to [4] [5]).

Again, because of the decisive role of teachers in K-12 education, teachers' epistemic beliefs, instructional perceptions, and their understanding of ICT application in educational practice are determining factors for how they design and organize their teaching. Thus, qualifying teachers in the sense of the new paradigm is the first step of educational reform in K-12 schools. However, a new question surfaces, namely: who is able to qualify the teachers? Chinese educationalists and policy-makers have realized that the key problem to educational reform lies in the lack of qualified trainers of teachers (see [6]).

In reality, there are numerous opportunities for teacher re-qualification in China. However, in-service teachers are naturally reluctant as they are already exhausted by their work load in the normal daily school duties. Most K-12 teachers would have to sacrifice their holidays for obligatory presence at the training courses. Further, the classes tend to be overly theoretical, and have little relation to real-world situations. In need analysis (see section 3) we found evidence proving in-service teachers' dissatisfaction with, and suffering from, such continuing professional development courses.

The task we are confronted with is how to support teachers' professional development by means of creating approaches which enable in-service teachers to:

- analyze critically their own practice in accordance with requirements given by the current reform measures,
- identify typical problems through the analysis, and seek potential solutions collaboratively,

- generalize what they have experienced and transfer such experience into their further practice, and pass on to other colleagues

In addition,

- it is not to be expected that teachers-learners will be released from their daily duties
- there are no examples to serve as a guide for such approaches in China

A tentative approach in dealing with the problem is to create a virtual learning community among self-motivated in-service teachers, where they are directed to explore how to handle the challenges caused by the current reform measures.

## **Reflective and Collaborative Learning to Support Teacher Professional Development – Theoretical Bases**

In educational history, there were many educationalists, e.g. Confucius, Socrates, Pestalozzi, Herbart, Dewey, and Tao Xingzhi, to name just a few examples of those who were educational practitioners and theoretical researchers of the praxis.

In the 1970s and 1980s, in order to stress the importance of teachers in education and overcome the divorce between educational research and its practice, Stenhaus and Kemmis [7] advocated professional development of teachers by means of teacher as action researcher. Teachers' research into their own practice has been identified as a fundamental approach to their professional development.

In educational fields, action research is often conducted by a group of individuals who share the same or similar professional experiences. The concept, as the combination of both terms shows, highlights the features of the research approach: practitioners, driven by a desire to resolve problems arising in their professional practices, analyze critically their professional experience and share their perceptions under theoretical and methodical guidance of experienced researchers in the field.

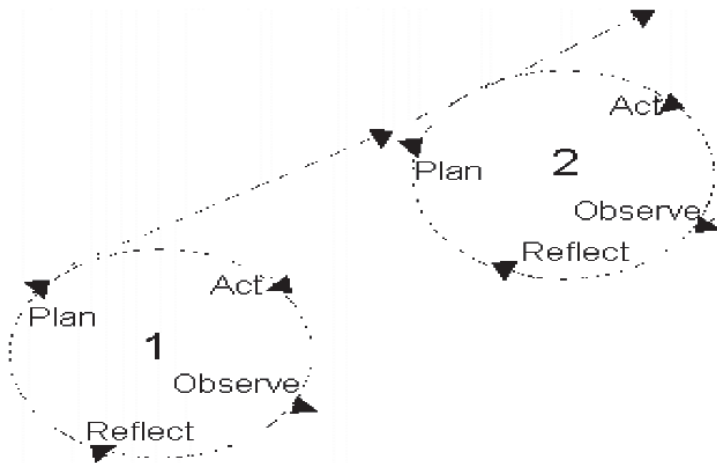


Fig. 1: Action Research Spiral (After Zuber-Skerrit, 1995, p.13. Adopted from Hatten etc. 2003)

Zuber-Skerritt (1995, in reference to [8]) has explained the reflective action research approach using the above diagram.

The four steps in this Action Research Spiral take place repeatedly in a continuous process of professional development. Within an action research cycle,

- The first step is to develop a plan of conducting a collaborative professional action plan;
- Secondly, the action is conducted by the group members jointly or individually, while the process is recorded by means of using a video-recorder, or being written down in a descriptive way, or inquiry into the critical events of the social context retrospectively;
- Thirdly, the recorded or described action process is observed, scrutinized, and evaluated, which is sometimes bolstered by thorough discussion and exploration;
- The process is completed by the reflection of individual members and the whole group. The subsequent reconstruction of the perceptions underpinning the conducted action in the social context lends itself to knowledge and skills transfer. This then serves as the basis for next spiral of action research.

The actions to be researched are more carefully designed and carried out than those from professional practice in daily routines. It is expected that the participants are going to be habituated in connecting the practice and reflection upon it. By means of repeating the action research circle, professional practice is then continuously improving.

In the process of conducting our collaborative project, which is aimed at creating an online training course for in-service teachers (to be described in details in Section 3), we developed a theoretical framework (Figure II) to stress the reflective and collaborative learning process within the virtual learning community (compare with [9] & [10]). The model of action research shown in Figure I shows the spiral progress in practice, while Figure II focuses more on the reflection and interaction from the viewpoint of the individual member.

Action research is a key research methodology guiding the design, organization and improvement of the learning programmes of a community and its individual members. Without the individuals' reflection upon his practical experience, and their willingness to discuss and share their experience with other participants, there would be no learning activities taking place in the sense of progress in cognitive and behavioral patterns. In contrast to the action research, the on-line community in VLE stresses individual and collective learning as adopted in our web-based teacher qualification. Thus, there are no special requirements for research methodology, rather, it is expected to support the participants to reflect upon their daily professional practice, to share instructional experiences with specialized colleagues, and to especially share their perceptions of critical events from the real school of life, e.g. motivational problems of students, professional burnout of teachers, reform measures relating to their rights and interests.



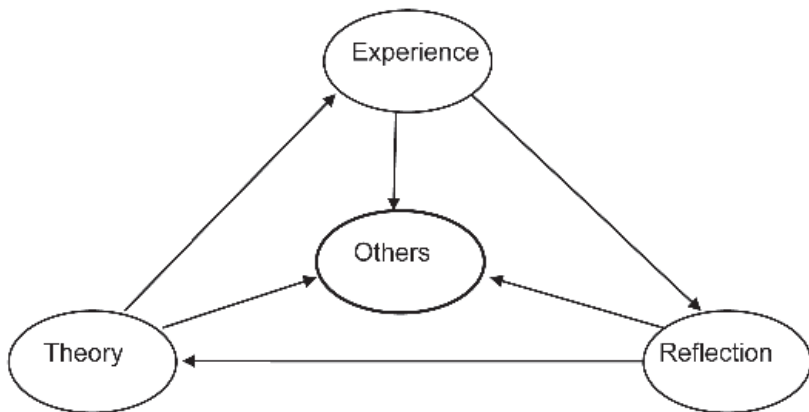


Fig. II: Reflective and Collaborative Learning within a Learning Community from member's perspective

We perceive that the course participants are able to communicate well in their common language, since they have very similar professional backgrounds. Communication is the key precondition, and stays at the core of collaborative learning. Through intensive communication, the expectation is to create shared perceptions. Under the necessary guidance by online learning tutors, who are normally educational researchers, the participants of VLC are encouraged to construct pedagogical theories or generate their own theories through individually and/or collaboratively learning the course materials delivered via Internet. The shared perceptions and theories are to be tested in the continuous practice of teaching and learning.

Given the situations described in Section I, we believe that the virtual learning community should be an effective way to help in-service teachers deal with the challenges caused by educational reform, since it allows them to participate in the learning course much more flexibly while completing their daily duties. At the core of the course are inspiring experiences of professional colleagues, instead of pure concepts and theories. More important is that in-service teachers learn how to apply ICT in education by means of participating in an authentic, internet-based context. They will learn to match the requirements of the New Curricula in completing such a course [11].

We intend to explore the approach in implementing the eChina~UK project.

# **eChina~UK Project: Virtual Learning Community among in-Service Teachers – Case Analysis**

## **What is the Project?**

The Sino-UK eLearning Program (eChina~UK) [12] is an initiative of bilateral collaboration in higher education, is aimed to jointly develop innovative eLearning courses in order to qualify teachers and to support intercultural research into eLearning practices and perceptions in both countries.

The project described here – one of three components of the Program – is conducted jointly by Beijing Normal University in China and the Universities of Manchester, Sheffield, Bristol, and Southampton under the auspices of the Worldwide Universities Network (WUN) in UK during the period from March 2003 till June 2005. This project is focused on creating three Master's level eLearning modules respectively in Educational Technology, Modern Pedagogy, and Educational Psychology, which targets in-service teachers at the secondary level in China.

It follows these objectives, as stated in the Project Proposal:

- To establish an effective and agreed model of eLearning suitable for Chinese teacher education;
- To develop high quality, collaboratively produced eLearning modules based on the agreed model;
- To establish a working relationship for continued collaboration.

In order to guarantee effective communication and collaboration, the partnership organized six staff exchanges during the implementation period, which was aided by Video Conference meetings and intensive information exchanges via email and telephone calls.

## **How is the Course Created?**

At the core of this innovative project is creating eLearning modules for in-service teacher qualification. Based on needs analysis, classroom investigation, interviews of stakeholders and intensive exchanges of ideas, all parties agreed upon an integrative delivery of

- learning programs, taking independent and collaborative learning in virtual learning environment,
- centralized online tutoring, and
- administrative and technical support by local study centers.

The course development followed a six step strategy:

- to jointly set general goals and principal requirements for each module;
- to decide the main contents, structures for each module and principles for learning activity design collaboratively;
- to create learning materials and to design learning activities separately;
- to review course drafts mutually and to discuss possibilities of improvement;
- to conduct a pilot project applying the drafted courses among suitable participants and to evaluate this jointly;
- to revise the course in its contents, activities, and its layout based upon the results of the pilot

To guarantee the fulfillment of academic requirements, the course creators compared the academic standards set by Quality Assurance Agency (QAA) in UK, and the Outline to guide Masters-in-Education Program in Beijing Normal University and used them as references.

In terms of course design, it has developed an instructional model of online learning community (Figure III).

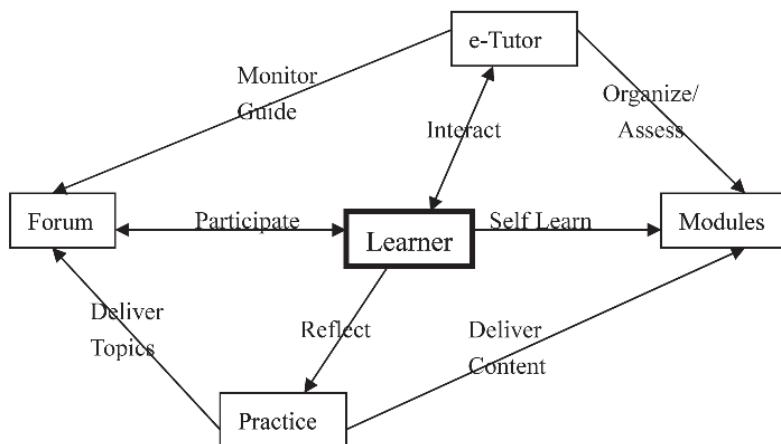


Fig. III: Model of Online Learning Course Design

The learners are at the central position in the instructional model. Learning contents and activities in the modules help them reflect and analyze their professional practice. In the online forum the learners discuss typical and critical events from their professional lives and share their perceptions. The E-tutor monitors the planned schedule in learning modules, the reflective and collaborative learning process, and offers methodological and theoretical support where necessary.

From a design perspective, the layout of the online learning modules has four sequential levels. At the broadest level of Unit, it describes general Aims and Outcomes of the Unit and Evidence which serve the learners as a detailed checklist for their learning achievements. At the level of Section, learning Objectives, suggested Learning Strategies and Learning Hours are given. Each section includes a series of Tasks, which comprise several Learning Activities. There are three main categories of activities: self-learning, group work, and forum discussion. Typical learning activities may involve materials reading, real problem analysis, retrospective explanation, interviews, summarizing, discussions and presentations. Learning assignments are designed for individual contributions.

The online learning course was designed as a stand-alone concept. During project implementation, UK partners urged us several times to decide on a fixed VLE (Virtual

Learning Environment-Platform), which would have different functions to support effective online learning, e.g. e-portfolio, access to reference books, enrichment resources, searching engines, course presentation, file keeping, plenary forums, and FAQ-area.

It was noted that different eLearning perceptions led to conflicting expectations for the project and strategies for implementation. This hindered the development of the project to some extent. Thus, in the follow-up phase, the partnership between Beijing Normal University and its UK counterparts decided to research intercultural understanding of eLearning as an approach to professional development of the staff in eLearning.

It is necessary to point out here that cultural differences shown in the project process went beyond eLearning itself. They were infiltrated by epistemic beliefs at the very abstract level to conflicting perceptions of very subtle issues, such as whether it is impolite in not having prepared a meeting's agenda. Thus, more research is needed into how to manage and implement an intercultural project in a more effective way.

A basic model of eLearning courses for teacher qualification in China has now been established[13]. However, whether this eLearning course is accepted by its audience or not, still remains to be seen.

### **How is the pilot project of teaching and learning organized?**

The initial pilot project was conducted among thirty-two in-service chemistry teachers from senior high schools in Fujian province, Southeast China. They were all senior teachers with at least ten years teaching experience. Some had been engaged with ICT integration in teaching and learning. Since most of them were not confident in using English in learning and communicating, we had selected one unit from each of the three modules initiated by Chinese teams to be tested. The selected three units are entitled "ICT integration into Classroom Instruction" for the "educational technology" module, "Nature and Nurture" for the "educational psychology" module, and "Educational Morality" for the "modern pedagogy" module. As the titles may show, all three are controversial topics of public debate concerning K-12 education.

WebCL, an eLearning platform, developed by Beijing Normal University, was selected

to support the pilot project. In comparison with most eLearning platforms applied in China, this VLE has at least two practical strengths. One is to support collaborative learning by means of various functions, e.g. tools for group activities. The second is to support assessment using tools for data management statistics based on records of online activities in VLE.

The pilot project comprised three phases,

- First, a 2.5 days face-to-face introduction, where the participants get familiar with the background and the main topics of the online learning course, including lessons on how to work in VLE WebCL. In addition, eight learning groups, with four random members for each, were set up. The following questionnaire survey demonstrated that most participants were satisfied with the introduction and with the architecture of the VLE, and they perceived the reflective and collaborative training style much differently from previous experiences.
- The main body concerned the three units of on-line learning, which lasted from Sept. to Nov. 2004. Three course creators were assigned as e-tutors to support this. There were three main activities:
  - 1. self learning course
  - 2. collaborative learning log ,
  - 3. participation in asynchronous discussion in forums. It must be pointed out that the whole pilot process was very laissez-faire, from instructional viewpoint. The assigned e-tutors simply reviewed, or remarked upon, a small portion of the assignments. Sometimes they were involved in the forum discussions. In contrast, about half of the participants were very active with online learning, due to internal motivation and great desire to do so.
- Finally we conducted face-to-face interviews with twelve participants to determine how they perceived the whole process as an approach to support professional development of in-service teachers. The semi-structured interviews included some of the following questions:
  - Are course contents relevant to your professional practice?
  - How did you complete the assignments requiring reflection on your professional experience?

- What motivated you to participate in online forum discussions? Or, what hindered you from doing that?
- How do you perceive e-tutoring and the relationship between you as e-learner and the e-tutor?
- What kind of assessment do you think can be suitable for online learning?
- Will you be happy to enrol in such an online learning program?

To judge the online learning course, the pilot project generated quite a lot of evidence, both pros and cons. From the instructional perspective, below is a list of relevant citations from the Preliminary Report on Fujian Trial Pilot [14]:

- "The material was considered by participants to be new and creative", and "the modules support the philosophy underpinning the new curriculum", "the materials encourage teachers to connect what has been learned, with their classroom practice".
- "More case studies should be included", and "that the cases presented in the module should relate more specifically to the secondary sector", and should "be relevant to the Chinese context".
- "...some participants had found it difficult to manage their study time with their workload pressures and classroom demands". Thus, "It was claimed that ... a longer timeframe for the material covered in the trial pilot project of 3 months would have been preferable to the 2 months offered i.e. one month per unit" (there are 30 study hours suggested for each unit, i.e. one learning hour per day – Author).
- Some interviewees "felt that a learning community had been established, as teachers engaged in dialogue with each other and with the e-tutor." "The forum tasks were described as 'stimulating'".
- "One participant perceived the e-tutor as a 'co-learner'." However, "there was an expectation that the e-tutors comments would be 'better' and of 'higher quality'". "...it was the responsibility of the e-tutor to moderate discussions and steer the discussion back to the main issues when participants deviated significantly from the topic".
- "Discussion in small groups, however, was reported by some participants as being not particularly productive". It would be "more productive", "if students had the opportunity to develop a relationship during the induction and also the importance of the group leader's role was noted".
- "'Reflection'... was claimed to be a ....'very different' and 'unfamiliar'

approach", though they all appeared to find the methodology favorable and thought it was good for their current needs, given the educational reforms currently taking place in China. Thus, the report suggested "Participants should be provided with details of what it entails, its purpose, etc".

- For face-to-face introductions, the report recommended "Participants should 'practice' using the forum and engage in online collaboration".

### **What is to be Learned from the Project from the Pedagogical Perspective?**

The above described questionnaire allows one to draw quite a series of general conclusions. From the pedagogical perspective, the following suggest itself:

- The concept of a course for professional development should be shifted from the assembly of topics and materials to be learned, towards a style similar to an action plan, which focuses on scheduled learning activities. A shift from content-focused to activity-led curricula development for adult learners should also be included.
- Online learning courses should be allowed to be re-structured more flexibly in response to expectations and contributions of learners generated in the learning process within a VLC.
- Practical orientation refers to enabling learners to deal with the real problems confronting them, rather than informing them about how to handle a possible task dreamed up by the teacher. Learning assignments should be identified jointly by e-tutors and the students during the learning process.
- Online learning does not reject other forms of learning. A well-prepared introduction, e.g. on the VLE architecture and the typical learning methods at the initial phase, will be conducive to learning effectiveness. A review and confirmation of what has been learned in the final phase is also considered to be necessary.
- Reflective learning and collaborative learning should be introduced in a systematic way to Chinese in-service teachers, when they are engaged as learners in VLC.
- E-tutors need to be trained for a moderating and facilitating role in group learning. The best way is through their direct experience as learners in the "authentic" online learning context.
- In order to guarantee more effective learning within VLC, "game" rules and responsibilities must be clearly defined at the beginning, and prompt modification



must be possible by means of discussion.

- Since 'examinations' are an integrative part of the learning culture in China, much attention must be paid to the significance of this mode of assessment for the learning in VLC.
- Learners expect to transfer what they learned into actual professional practice. Therefore the course content must be relevant.
- International co-operation in educational fields should focus on in depth into the collaborative development of the curricula, which promises a lot for cross-cultural comparison in many aspects of education. Web-based learning offers not only a field to be researched innovatively, but also an approach for conducting intercultural research, which may also predict any emerging paradigm shifts in educational practice.

## Virtual Learning Community as an Approach to Teacher Professional Development–Tentative Conclusion

The study of the eChina~UK Project described in Section III has delivered evidence supportive of VLC as a tentative solution to the current problem of teacher qualification in China, stated in Section I (the lack of qualified trainers to support in-service teachers' professional development in the sense of New Curricula and ICT-based pedagogy).

Professional development as an actual term of further qualification for professional purposes, emphasizes the continuous progress of personal competence system in accordance with quality improvement of service and production. In relation to in-service teacher qualification, their competence system influencing the students' development as 'service quality' refers at the general level to pedagogic perceptions of what ought to be taught, instructional patterns of how to teach, and personal self concepts (e.g. whether any one teacher is able to deal with new situations that arise in practice). The first two seems to be the objects for which the teachers will be prepared by means of professional qualification, while the third forms a precondition under which professional qualification as a learning process takes place.

Research in vocational education [15] points out that professional experience can

be a barrier to learning or adapting to new concepts and skills. This statement contradicts the popular thoughts which value the professional experience, e.g. of senior teachers, as a treasure for individual and institutional development (in reference to e.g. [16]). In other words, how does one perceive and treat his/her professional experience? Such a perception is a component of self-concepts which determines whether a person is ready to learn new and different things as an aspect of professional development.

In terms of cognitive development, Piaget's "Genetic Epistemology" explains two patterns of how one's cognitive structure is adapted to external events:

- Assimilation involves the interpretation of external issues in terms of existing cognitive structure, whereas
- accommodation refers to changing the cognitive structure to make sense of the external issues.

The constant interaction between cognitive structure and their external stimuli, alternately in both adaptive patterns, forms the continuous cognitive progress. The progress in behavioral patterns can also be explained similarly.

Whether an encounter with a new or different issue in professional practice leads to an adaptive learning process depends on how the person perceives his/her readiness to deal with it in a different way than s/he usually does. A social environment, e.g. a learning community, where the involved person can find a role model to follow and a strategic reference to deal with a similar issue, is conducive for him/her in making the best decision.

Within a social environment like a learning community, the person concerned will be apt to examine his/her own cognitive structure, behavioral pattern, and self concepts, because peers with similar professional experience offer different perceptions and strategies in dealing with similar issues. Such examination not only offers different approaches, but also encourages them to learn in a different way, which can overcome the negative effects of the "inert" self-pleasing professional experience.

In professional VLCs, a member originates his/her perception of an external issue in a free and critical way, and shares it in an understandable language with his/her peers. Because the discussion is taking place in a virtual space, the community member can

be concentrating on the topic without being disturbed by any physical factors. They are able to analyze it in depth, and then post their arguments, reasons, and doubts without any concern with "losing face", or of hurting somebody else. Surely, s/he can search for support from the e-tutor for evidence from the related learning materials. All past discussions are automatically stored in the forum.

For reflection and knowledge generation, VLC is more ideal than any form of face-to-face interaction and communication. Furthermore, from the long-term perspective, to participate in a VLC course means continuous improvement in professional practice.

In comparison with current teacher qualification provisions, which are featured as knowledge-transferred, trainer-focused mouth-to-ear training, VLC creates an environment where the teachers as learners are active players rather than passive audience members. They have more fair, free, and autonomous opportunities to express themselves, and more possibilities for reflection and meditation in a self-regulated way. They are also more readily exposed to different thoughts and conflicting arguments, which are more directly based on professional experience rather than on boring, unrealistic, predictions.

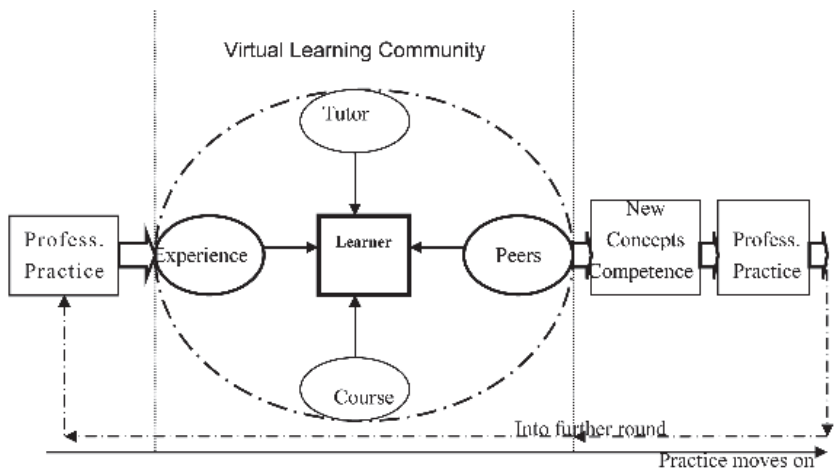


Fig. IV. Instructional Model of Virtual Learning Community for Teachers' Professional Development

VLC offers the in-service teachers, who are normally alone in the classroom, an opportunity for frequent and intensive interaction with professional colleagues, which serve them as an additional way to enrich, deepen, and sharpen their professional experience, as well as to fight against professional loneliness and burnout.

Based on the above study, a dynamic model of the VLC as an approach for teachers' professional development (see Figure IV) is recommended.

There are some points to be stressed here, concerning the instructional model:

- It focuses more on the interactive learning process within the VLC, rather than on linear, exclusive course design.
- Reflection on professional practice is the starting point, and improvement of the professional practice is the final aim; the success of reflective learning is evidenced by improvement already seen in practice.
- Communication and collaboration serve to stimulate reflection and critical analysis, to foster the dissemination of what has been learned.
- E-tutor as a member of the VLC, acts to facilitate learning methods and moderate interactive process, but NOT a transmitter of knowledge
- Online learning courses offer a shared schedule of common learning materials related to ongoing individual and collaborative learning process.
- VLC as an approach to professional development should be understood as a way of continuous professional improvement, a way of lifelong learning.

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## Experience and Perspective of the University-based International Cooperation and Research

### - An overview of the Asia-Link Program DCCD

### Needs Assessment of TVET International Cooperation

The development of economic globalization has resulted in the international transference and distribution of workers, and has offered a special challenge for international cooperation and academic research in the technical and vocational education and training.

On the basis of the social, economic, technical, cultural, and historical environment, most nations in the world have established their specific Technical and Vocational Education and Training systems to meet the challenges of improving the capacity of their workforce. But in the current more rapidly changing, and globally competitive world, international cooperation and academic research in TVET are important in helping each nation to quickly respond to its own national development and to global competition.

Listed below are key elements to be comparatively analyzed in TVET international cooperation and research:

- Position and function of TVET in the national economic and industrial structure;
- National framework of TVET, including the national occupational certificate framework, coordination between industry, government, and TVET providers, etc.
- Philosophy, methodology, and organization of TVET curriculum;
- Management and development of TVET teachers/trainers;
- Quality assurance and controlling of TVET

The UNESCO International Meeting on Innovation and Excellence in TVET Teacher/

Trainer Education is the cornerstone for research and development of the international framework for the university-based master's degree program for TVET teachers.

As a local application-oriented university, Beijing Union University is engaged in academic research in technical and vocational education, offering courses of Higher Vocational Education in several vocational disciplines, as well as offering training programs for TVET teachers.

Under the international cooperation framework of TVET, Beijing Union University, China and Bremen University, Germany have established a relationship for academic research in TVET, and have jointly applied the Asia-link research program.

## Establishing a Research Partnership

### **Brief introduction to partners**

To realize the optimal research outcome, the partners should have common goals in organizational mission, organizational culture, and research fields. The IHVE and ITB are the appropriate partners for TVET research institutes, as they have similar cooperative networks and research interests.

The Institute of Higher Vocational Education (IHVE), Beijing Union University (BUU), is one of the leading research institutes in Higher Vocational Education. BUU is one of the largest comprehensive universities in Beijing. It has a strong profile in education and academic research in the technical and vocational disciplines. Currently there are more than 50 programs in Higher Vocational Education with more than 9,000 students enrolled. Due to its strong academic research competence, BUU has been appointed as the nation's flagship university in the Higher Vocational Education, and runs many key courses ratified by China's Ministry of Education. Under the IHVE, there is a curriculum development center which focuses on the academic research for curriculum design, development and promotion of TVET.

The Institut Technik und Bildung (ITB), University of Bremen, Germany, is one of the largest German research institutes in the field of Vocational Education and Training (VET) and has dealt for a long time with professional profiles and curriculum development. ITB's expertise has been sought out by the Asian countries and forms the basis of the project.

As one of the leading research institutes in vocational education and training, ITB runs its research committed to the idea of shaping the triangle of work, technology, and education. The institute aims at a close cooperation for the reform of vocational



education and training, and innovation in the field of work and technology. Therefore, not only an interdisciplinary but – in times of globalisation – also an international research-approach is necessary. For that reason educators, engineers, sociologists, economists, and specialists from several other disciplines are engaged in the research of the ITB, which often is embedded in national or international networks. The ITB covers a wide range of research and development projects on a regional, national, and international level. Most projects are run in cooperation with industry partners and other VET institutions. In addition, the ITB acts jointly with relevant institutions in Europe, the United States, China, Thailand, Japan, and several other countries.

### **Finding a common research area**

On the basis of the comparative analysis, IHVE and ITB found the following similarities concerning research:

- Research and development in the field of VET in relationship to technology, especially in the curriculum development for TVET,
- Research and development in the field of innovation, HRD and regional development,
- Research and development in the field of information technology,
- Research and development in the field learning, teaching, and education,
- Education of technical and vocational teachers for a university.

As a world renowned research institute in the TVET field, the ITB has done extensive research in all fields of vocational education and training in Germany and, at the international level, has participated in over fifty pilot projects, surveys, and analysis projects funded by the European Union. The institute has played an active role in forming research networks at the European level, and actively collaborates with organizations in the USA, China, Japan, Thailand, and several countries from Africa and South America.

In China, a reform of the vocational education system is under way with the help of international advisors. The linkage of vocational training and actual work experience in companies is a key priority for vocational system design. However, there is a dramatic shortage of a) VET professionals who are able to contribute to the design of an adequate vocational education system and, b) vocational teaching staff, who are able to use the leeway provided by official vocational profile definitions in order to adapt vocational education to regional needs.

After several discussions, the partner institutions jointly applied for the Asia-Link

Programme for curriculum development in 2003. Because of wide experience in project and programme management, ITB will be responsible for project co-ordination. The ITB will also provide significant input for curriculum development because of its expertise in VET and VET teacher training, and they will run the training of the staff.

## **Research Project DCCD**

### **Objectives of the DCCD Project**

In order to back social and economic development, China must be able to design vocational and educational systems which are compatible with their social and economic systems. The purpose of the project is to build up expertise in curriculum development for vocational and higher vocational education in China, both at the planning, as well as the executive level. The intention of the project is to develop and implement a course in curriculum development methodology on secondary vocational and tertiary vocational education (including curriculum, course material, and additional certificates). Implementation of a common module in vocational teacher courses will take place in Beijing, Kuala Lumpur, Duisburg, and Bremen. The target groups of the DCCD project are university teaching staff, graduate and postgraduate students of the academic field "Vocational Education and Training", as well as vocational, higher vocational and education professionals and planners.

### **Main research activities**

The main activities of the DCCD project are the co-operative development of regionally adapted tools for VET curriculum development, the development of a joint curriculum for a course on VET curriculum development, production of training material, qualification of staff, and implementation of the courses into the education system in China.

The methods and tools for curriculum development and implementation, which will be the central content of the training materials has already been developed by ITB in the German language. This material will have to be reworked, extended and translated as the basis and starting point of the project.

The 3-year research project includes the following main research activities:

- Development of toolbox material including reworking, and translation
- Seminar in Germany and training of the research staff

- Curriculum development course for project participants
- Prototype application in China
- workshop in Malaysia, and modification of methodology on the basis of experiences with prototype applications
- Adaptation of methods and curriculum
- Develop and pursue implementation concept
- Prototype implementation
- Workshops and international conferences in China
- Publicity and dissemination of information

IHVE is the organisation that specialises in the academic research for BUU and the municipal government. At the end of the present project, IHVE will continue to promote the project's research results.

## Prerequisite for the implementation of the international academic research

During the research process, the project partners take advantage of possible chances to communicate, meet, and organize seminars. However, some of the difficulties faced by the partners need to be resolved. The prerequisite for the project research and the pilot study implementation should be as follows:

- **International network for research and cooperation**

The organization and coordination of international cooperation and research require social skills, energy and time. The power of the individual university is limited, so it is necessary to establish an international network to coordinate the activities between the universities, research institutes, governments, industries, and the TVET providers.

Although the network on innovation and professional development in TVET was founded as an umbrella organization for TVET research and teacher/trainer education under the international standard framework of the university-based master courses, and although the worldwide UNEVOC network is conducting the coordination between the 230 member institutions, more professional networks or associations should be established to facilitate international academic research.

- **Coordination and administration of the project**

To facilitate coordination and administration, the project partners have established a communication platform, including a project website with internal document exchange facilities, mailing lists, and a discussion forum. However, because of some technical factors, the regular video conference is not feasible, so it is necessary to solve some technical problems to set up a convenient international videoconferencing system.

- **Cross-cultural communication**

Although the toolbox of the curriculum development has been developed by the ITB in German, the project partner must wait for the translation before the project can begin. The English version of the website, the academic articles, the research documents, and cases are very important for communication.

- **Comparative Analysis and Adaptability**

The technical vocational education and training system of a nation is closely related to the social, economic, technical, and historical conditions. In China, the vocational education system consists of the secondary vocational education and the higher vocational education. Therefore, the comparative study between the Chinese vocational education and the dual system in Germany, the TAFE institute in Australia, and TVET systems in other countries, is difficult. It is also not easy to find a recognizable international standards framework to evaluate the TVET system. On the basis of the national educational environment and traditional culture, the project should find a way to adapt the research results and the successful experiences of any one country to all the countries involved in TVET. Hopefully the project finds a way to establish the appropriate Chinese TVET system, especially to find the solutions of the curriculum development and training for the TVET teachers.

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# VET from the Viewpoint of the Enterprises – New Challenges for Companies and Training Institutions

## Introduction

Enterprises today act in a dynamic and globally-oriented environment. Industrial production processes are becoming more and more similar. Consumers expect the same high-quality standards, regardless of the continent they are on. However, products with superior quality and competitive prices can only be offered by enterprises that have highly qualified human resources available.

The working environment is continuously undergoing a process of change. Technology, especially information technology, is developing rapidly and has a great effect on the global economy. Companies have to compete increasingly more in the global market. But to do so, they need human resources that are able to deal with this new situation. A successful enterprise can answer this challenge in different ways. Some possible responses are to minimize the hierarchies, decentralize the tasks, or delegate more responsibility to the working level. Another strategy is to concentrate on the core business, and no longer manufacture the entire product components within the company. Instead, the company will produce only goods that other competitors cannot fabricate better. As a result of these strategies, companies will decide to outsource some of their departments. In a situation where technology is becoming more virtual, as with software products, the latest technological developments become quickly available and transferable to any place on the globe. A strategic and significant advantage for companies lay in their personnel. It is the staff that can handle the available information and convert this into valuable products. These products would then offer the necessary quality to attract the customers who are willing to pay for this advantage.

Considering this fact, it is clear that in the field of professional qualification, adequate

international standards are expected. These standards are set by trainers, teachers, and others who are involved with VET in their respective countries. The importance of an efficient network between the institutions of VET (public sector) and private enterprises (private sector) becomes obvious. Only when graduates attain the needed qualifications and competences that fortify the enterprises in their competitive capacity, can the overall goal of a national education policy be reached. Without well-qualified trainers and teachers in the field of VET, a flexible and creative staff will not be available to businesses.

Successful companies already recognize the importance of the availability of a well-trained and competent workforce. Because of new production conditions, new technologies, and social changes, requirements for the qualification of employees have changed in the recent years.

A successful effort to adjust the system of VET according to the needs of the companies will lead to the implementation of the needed functions within the system. This will contribute significantly to the goal of greater competitiveness in the national and international economy, as well as increasing the employment possibilities of the graduates.

This paper will focus on the causes and the expectations resulting from this situation. International operating enterprises are often willing to cooperate with VET institutions in order to attain the employees ready to compete in a successful market. The importance of strong cooperation between VET and private businesses is to be emphasized. Proposals for the practical organization of possible cooperation will also be developed. Since the idea of an intensive and fearless cooperation between vocational institutions and businesses is still new among some involved in the field of VET, it is necessary to recognize the potential and to use it for the benefit of all.

On this point I would like to stress the importance of the small enterprises and entrepreneurs that are in need of qualified personnel. Considering the labor market, this is a very important target group for the VET. The German dual-training system has its advantages, particularly for small and medium enterprises. During the practical phase, the trainee is occupied with action-oriented, dealing directly with real customers. During the shorter theoretical phase at the vocational school, the trainee can learn new techniques and methods that can be implemented for the improvement of the entrepreneurs' business.

Only when the trainers and teachers of VET institutions know about the real demands

of the economy can they organize a well-balanced teaching environment for the trainees. These trainees can gain the skills that are needed for both the companies and the trainees. Trainers and teachers can only understand the importance of quality-orientation, customer-orientation, or process-orientation if the national VET System gives them a chance to educate themselves on these subjects during their training.

The German dual system of vocational training has a long and successful history. With the help of this system, practically trained and qualified graduates are able to work in companies. In Germany the companies have to carry the main responsibility in the field of vocational training. The idea is to have a training system that is driven directly by the demand of the economy.

In the dual system, a combination of learning and working, provides the basis for training vocational skills. The system seeks to teach theory and practice, and to impart structured knowledge and competence, in their proper context. The different learning sites, in the company and at the vocational school, interact closely emphasizing their strengths, although their tasks are not rigidly divided: school is not reserved solely for teaching theory, and in-company training involves more than just practice.

Vocational training should prepare people for specific occupations, to be pursued immediately after the completion of training, but it should also prepare people for further learning. For this reason, two of its important components include promoting the desire to learn and fostering personality development. To work in the knowledge society, people must be able to plan, implement, and check their work independently.

## The Situation

There are several factors that are changing today's working conditions and the society. Well known to all is the phenomena of globalization. There is no doubt that China is a winner of globalization. For vocational training, it is important to focus on intercultural skills because the staff in many firms is becoming increasingly multinational. Also, their customers are from various countries. The qualified personnel have to understand the differences in cultures, and the need to communicate in different languages. Globalization has a multi-dimensional effect on VET. It changes

the conditions for the companies, and this often means a change in demands on the employees.

Another point that makes the adjustment of the traditional education system necessary is the change in values. Families today are different compared with the past. Changes in families, mean changes in the society. A possible answer to this situation is a change in customer orientation. Even institutions of VET have to consider this question.

Nowadays, more work is virtualized. Computers and the internet are everywhere. Therefore, vocational training has to strengthen these skills. Technologies and production systems are changing rapidly. Everyone has to deal with this dramatic change. So it is of great importance to focus more on people – on the strategic factors in business of human resources – instead of concentrating on the memorization of pure theoretical knowledge that is available everywhere.

In many fields, including vocational training, the economic point is becoming more important. The training of future employees can be understood as an investment. Therefore, it might be a good idea to orientate the training activity according to added value criteria.

## Consequences

An increasing number of companies in Germany that are involved in vocational training, manage this activity like any other business activity – according to an economic process chain. First, we have schools as the basic supplier of human resources. Vocational training can refine these students, so that they are prepared for the labour market. During this process, vocational training has to deal with several partners such as unions, management, vocational schools, and trade organizations. Of great importance are, of course, the parents of the trainees and the peer groups. They can affect the training process positively, but also negatively. These are the preconditions that a professional in vocational training has to be aware of. To consider the training itself as an economic process makes it easier to not only transfer these necessary ideas to the trainee, but also to the participating companies. Therefore, the training activity itself becomes more efficient and more effective.

For trainers and teachers, a basic understanding of economic processes is very important. During training, the trainers and teachers should have the chance to



work under real-life working conditions that involves the economic aspects. Only when teachers and trainers know about the principle function of a company are they able to transfer this knowledge to future staff members.

A very important question of anyone running a business is, "Who is my customer?" The new thinking in vocational training can only work if the responsible managers of vocational training institutions know about their customers. The primary customers are the future employers of the trainees. How can a training institution make the companies satisfied with their product – qualified and well-prepared human resources?

On the other hand, there is another class of customer: the trainees themselves. It is obvious that a good product can only be generated when the raw material fulfills the needed criteria. Therefore, it is important to find the applicants that truly fit the necessary profile.

This is, of course, a big challenge for people working in the field of VET. If we talk about customers, then we have to talk about products. Everybody has to answer the question of whether he can offer a product that the customer really needs. According to this philosophy, the VET institution is a service center and is steered directly by the needs of the industry. If this can happen, the second customer group – the trainees – are also satisfied because the VET institution can offer training that increases the chances for the trainees to find a job after graduation.

This leads to the question of our product indicators. When is it possible to say that we succeeded in producing graduates that the economy is looking for? The half-life of knowledge is too short to concentrate only on this factor during the training process. For example, the half-life of IT knowledge is only one year. For technological knowledge, the half-life is one and a half years. For vocational knowledge, the figure is 5 years. If we consider a training time of three years, it is obvious that concentrating on knowledge only will not lead to a satisfactory result. The person itself is more important than pure theoretical knowledge. The trained specialist has to acquire the ability to produce knowledge on the spot when needed.

During the beginning stages of the training process, the development of basic occupational knowledge is very important. First, the trainees need practical skills to enter the professional field. Later in the process, the development of an individual's

personality comes to the fore.

To be successful on the job, one needs more than pure knowledge. The product of a VET institution has to have the ability to act as a specialist in his field. The trainee has to develop a personality and an attitude that helps him to be organized, to act responsibly, and to use the existing and available information in the best and most efficient way to fulfill the given tasks. The development of social competence should start after occupational skills and knowledge have been reached.

## Action Competence

Modern companies expect action competence from their employees. Only with qualified human resources can companies compete in a globalized economy. The action competence consists of occupational, individual, methodical, and social skills. Occupational competence is, of course, the base of any profession. Without the fundamental knowledge and skills, no qualified tasks can be fulfilled. If there is an electrician, she or he has to know about electricity and has to understand the basic physical rules. Occupational competence means having the ability to recognize professional connections, develop professional creativity, and execute self-responsible, independent, and professional tasks according to the demands of customers.

Individual competence is the ability to appear and act authentically, creatively, and persuasively – all of this with a positive attitude. Dealing directly with customers puts a premium on these qualities.

With the working environment becoming increasingly complex, with added responsibility, the employee needs methodical competence. This is the ability to recognize action structures and to gather information systematically. He should be able to choose and apply successful theoretical and working methods for every professional situation.

As work becomes more complicated, we need to work in teams in order to remain efficient and competitive. However, to do so we need social skills, that is, the ability to interact with others, to work in a team, conduct productive dialogs, and to eventually manage a team.

The action competence is the integration of professional competence, individual competence, methodical competence, and social competence. An employee has the ability to solve problems when he has the necessary action competence.

The important point for companies is that the employees are able to fulfill business tasks in a professional way. To attain good results, the staff needs the action competence to satisfy the internal and external customer.

The traditional hands-on oriented qualification is complemented by more comprehensive qualifications, such as business orientation. The trainee should understand the whole workflow process of an order. Every staff member should be able to think like an entrepreneur.

With the help of integrated training projects, real economic processes could be shown and executed. Traditional training modules and projects that have little to do with the workings of a real business should be replaced. The well-trained and qualified employee needs to be able to see the entire whole business process, from placing the order to the billing.

It is expected that we will see an increasing demand for individual social skills. One reason is that the production sector will become more automated, resulting in fewer jobs. Companies need employees who are able to act independently and responsibly. Professionalism is, of course, the precondition for any career. The VET institutions must take this situation into consideration. As a result, the training of teachers and trainers should be in an environment that allows the development of social skills.

We are living in a rapidly changing environment, especially in the economic field. In former times we had strict working hours, but now the hours are more flexible, even for the trainees. In the past there was always a specified work plan. Now we expect independent planning from our trainees. Instead of waiting until for the master to issue the work orders, this work will be done by a team. In the past, it was the supervisor who was responsible for materials and tools. Now, the trainees will take over the responsibility for the tools, in order to prepare them for similar duties in a real job. Quality control used to be a task for a separate department, but now we expect the trainees to take over this job. Also in the past, progress control used to be done by the supervisor. Now we expect our trainees to fix the schedule in cooperation with the customer. Previously, the realization of a project was done according to a given plan and instruction. But now the trainee has to learn independent planning, realization, and quality control.

## Process Orientation

One very important point to a modern and effective understanding of training and qualification is the process orientation. This is significant not only in connection with the learning process, but also in dealing with the business process.

The learning process describes the transfer of occupational knowledge, skills, and experiences in the form of a developing spiral procedure. The learning process becomes tangible if we consider it as a complete action procedure. This procedure can be divided into seven steps. First, there must be a clear target description. The problem must be recognized. The next step is to gather, assess, and understand all relevant information and working documents. After this, the planning is to be done. The necessary steps are then generated and it is coordinated with the necessary personnel. After the planning phase, decisions have to be made, and many criteria (technical, economical, ecological) have to be taken into consideration. After this, the action plan is to be executed. Tools have to be used professionally, and safety regulations have to be obeyed. Next step is to evaluate the results and decide if the target is reached. The process and the results need to be documented. Finally, the entire action has to be assessed. Possible improvement should be explained, the next target is determined, and the cycle can start again.

Each of these complete action procedures helps to generate more practical work experience. This type of training prepares the trainees for the challenge of life-long learning.

For the trainee and for the trainer it is important to understand the business process. Business orientation means to not only knowing the whole process, but also the sub-processes in which the individual trainee is directly involved. After training, the new staff member has to be able to offer useful input so as to contribute to the success of the overall business process. Possible contributions can be the optimizing of the production process, improvement of quality assurance, transfer of knowledge and experience, and further development of customer relations. A real business process orientation is for those who are willing to take over more responsibility, and for those who want to develop their own career.

Training should focus on values. This is because we want to develop a specialist beyond just memorizing pure theoretical knowledge. In a time of wireless internet connections, knowledge can be gathered at any place and at any time. The challenge is to use this knowledge in a proper way. To be successful in this regard, it is important to develop creativity as well as an environment that allows satisfaction. It is nearly impossible to force someone to be creative. The challenge for training institutions is

to create a learning environment that combines education, creation of values, and satisfaction of trainees to generate the necessary skills.

## Key Qualifications

To help trainees develop, one needs a few indicators. Key qualifications are of great importance for education and training. They can be used to make social and personal competences more tangible. In key qualification, a company or a training institution can express the most important points they want to focus on. This is an instrument to help develop the human individual and not just theoretical knowledge. But if the focus is only on the development of the individual and not on the occupational skills, the goal will not be reached in the long run.

It is not easy to find a proper way to evaluate key qualifications. For the well-trained trainer, it is necessary to know how to observe team or individual work under the aspect of individual and social competence.

Regarding this point, the new challenges for the next generation of trainers and teachers is apparent. What is desperately needed is the ability to observe trainees while they are fulfilling their tasks. It is not enough just to evaluate one-dimensional answers to given questions. The good trainer has to recognize degree of skill. He or she has to act like a coach not only to evaluate, but also to give support when needed. The training and qualification of the trainers must take this into consideration and offer them an understanding of personal and social competences in a real working environment. Only then, will trainers be able to be good coaches able to produce the type of excellent human resources companies need in order to survive in the global market.

The overall goal of vocational training is to give young people a chance to compete in the job market and to give them a bright future. After completing the training, they should be able to find a proper job where they can grow and find a place in society. Training should make the transition from youth to working life a smooth one. The working life depends on economic processes which need to be understood. In the value added view of economic processes, we can say that vocational training is an indirect aspect of value creation. We can consider it as a tool of human resource management, and it can lead to competitive advantages for participating

companies.

This value added view can be used not only to explain how business works, but also as a training instrument to develop integrated training projects, or to create learning islands (explained below).

If the value added aspect is considered in training, products and services that are useful for the enterprise or the institution will be created. During training, students are involved in the goods and services sides of a business.

## Learning Island

To generate a training environment that is oriented toward the real demands of working life, the idea of a Learning-Island was developed. The Learning-Island makes it possible to implement the action-oriented approach in the form of an integrated qualifying model. Traditional training sequences are divided into sequential steps. The result is that the trainee observes and experiences just one part of the business cycle.

In the Learning-Island, the trainee is involved in the entire added value chain. The trainees have to deal with the customer internally and externally. They have to gather the necessary information. The next step has the team of the Learning-Island do the planning. Through this, they will decide how to fulfill a task. Before delivering the products to the customer, they have to do quality assurance. Finally, they will assess what they have learned out of the experience. During the entire process there is a trainer available, ready to support the group if there are any problems such as excessive demand and losing focus. With the help of this training model, the functioning criteria of an added value chain becomes obvious for every team member. For example, if a mistake occurred during material purchasing, they will learn through their own experience that this will affect the entire production process. Depending on the size of the Learning-Island, marketing and accounting activity may also be included into the task portfolio of the team.

Students of VET should especially have the chance to gain practical experience as a significant part of their training. There should be room for project work, where the students are involved in the financial aspects. They need a place where they can

carry responsibility and develop the skills they need as a professional in the field of vocational training and education.

For example, in the area of Automation Engineering, there can be a project dealing with the technology of intelligent houses. In a practical research environment, the actions and behavior of people around high-tech solutions in the domestic environment can be investigated. The team of students will be responsible for integrating new products and devices in the intelligent apartments. They will have to observe their functions, trouble-shoot, repair any faults, and assess their functionality and usability. It is also important to interact with the customer, which in this case, may be ordinary people who rent the intelligent flats. In this case, a university can create a win-win situation. On the one hand, a training environment can be created to simulate the real world. The students can learn about a work process and can understand the importance of the action competence by carrying out a business task. On the other hand, a high-tech research project can be executed with significant results for the industry.

This is only one example of how to generate a win-win situation in the university environment. We have a field of research (on how customers handle high-tech products), and we have the task to train the students in an action-oriented environment. This training needs to be planned and observed by the lecturers according to the principles of the action orientation. A competence profile can be worked out and the necessary qualifications determined. In this example of a learning-island, all main factors of a modern competence-building setting can be created: customer-orientation, quality-orientation, and the crucial action-orientation.

A trainer or teacher can only train action-competence if he or she knows business processes by experience. The processes are practical skills that cannot be transferred only using theory. In a practical action-oriented competence field, different specialties and different competences have to be utilized to come to an appropriate solution of any problem. In the example of an intelligent house, with flats rented to ordinary people, an environment is created such that it can be used by students year round. By using the high-tech sector, with ever-changing and updated products, a situation will be avoided that by dealing with training projects often occurs. By serving companies and promoting their business activities, competition between the university and the private economy is avoided.

The other advantage is that good relations with companies will have a positive influence on many activities in the university. The research activities can be streamlined according to real demands. The university can acquire customers for

technology and product development. The students can also get in touch with potential employers.

By developing this high-tech know-how, the region becomes attractive for potential investors in the field of home automation, which includes several industries like IT, communication, installation, energy supply, home entertainment, and the like. This is of course only one example of an action-oriented training field for trainers, teachers, or engineers. However, this shows that there is a huge potential for the adjustment of training in universities according to industry demand. This is desperately needed for both the company and their employees. After focusing on this practical example, I will continue with some general ideas about the Learning-Island.

The implementation of Learning-Islands depends on the structure of the companies. For example, a Learning-Island can produce some tools, which are necessary for the production process. Or it can give after-sales services to customers. A company, university, or school can give the responsibility for office equipment to a Learning-Island. Other examples may be the organization of a back office or the preparation of a celebration or anniversary. The presentation of a company in a trade fair can also be organized by a Learning-Island.

To be successful in establishing the Learning-Island, several conditions have to be fulfilled. The trainer must trust the trainees. He must allow them to take some responsibilities. The trainer needs to learn to let the trainees make their own decisions. He has to accept that the trainees may reach a solution in a different way than what the trainer expects.

Coaches and trainees should develop a positive fault culture. It is normal in daily life to make mistakes. The challenge for the trainer is to create an environment in which the trainees learn from their mistakes so that in the future, these and other related mistakes can be avoided.

In the case where the trainer or teacher from a vocational training school has no practical experience in a real working environment, it is imperative that he attains this knowledge. Theoretical knowledge has no value in itself. It is only needed as the basis and background to fulfill the practical working tasks, both professionally and responsibly. This is a fact that is sometimes not easy to understand if one has never been involved in realistic financial situation. It is not the isolated theoretical knowledge that is the basis of a prosperous national economy.



Trainers who see themselves as a coach in the field of action-oriented training need to behave in a performance triangle. The coach must allow the trainees to make their own decisions. He must trust the trainees and help them develop their own personality. The trainees will be confronted with situations they will face later in the real working environment. They will learn how to deal with faults and mistakes, and will carry responsibility. Normally, this will motivate the trainees to enhance their efforts. They will clearly see why they have to learn, and they can experience the satisfaction of customers as well as their own success.

The trainer has the task of supporting the Learning-Island trainees if there are any problems. He has to observe the performance of the team members based on the development of the individual training process of the trainees. If the coach recognizes poor development, he has to offer support. If he assesses an outstanding performance, he should then encourage similar further development.

## Teams

Many tasks in business can only be fulfilled by working in teams. But to work effectively on a team is not easy. It is a process that has to be learned. This is also a target that can be reached through Learning-Islands. Some indicators of a positive learning culture in teams are: Giving feedback, learning from others, reflection on the work accomplished, helping each other learn, recognizing the potential of others, being happy with each other, respecting one another, and being happy for each other. One cannot learn to work successfully on a team by theory. One needs to learn by practice, and by executing real tasks.

It is the responsibility of the manager or coach to create a positive "we" sentiment. Only then can a team work as a learning organization. Several conditions must be fulfilled, such as mutual responsibility for the results, mutual action strategies, mutual tasks, and mutual targets. A team is performing well when the different skills of the team members are used in a complementary way. Important is the number of team members. The number should be in the range of five to ten. It now becomes clear that the role of the trainer then changes. Under the condition of the action-orientation, the trainer is not the teacher who knows everything and stands in front of the class to explain theoretical knowledge. Trainers should act like coaches. They

should support the trainees during their learning process. They should ask questions to help the learners to find the solution to their specific problems. They should help them to develop their skills and to perform well when faced with the challenges of their future working life.

## Summary

In this paper I tried to explain new developments in vocational training and education in a very practical way. In Germany, the vocation training system is steered and financed mainly by companies. The system can offer benefits by the direct linking of the customers to the training process chain. Companies will only participate in the system if they see some benefit. The benefit is the development of well-trained and qualified students who can compete on the job market. The challenge for the institution doing vocational education and training is to qualify their future staff to attain the occupational expertise they need. They also need to acquire methodical, social, and personal skills. They are becoming more and more important in a changing working environment. The main target is the development of action competence, which leads to the ability to more efficiently solve problems. By their willingness and their ability gained through life-long learning, they are ready to take over responsibility and to be creative.

The modern learning environment of a vocational school should be planned and organized in a way that takes the demands of the companies into consideration. There should be trainer-centered and trainee-centered phases according to the learning target that is expected. The schools must create conditions that allow trainers to execute action-oriented phases. This is only possible if the schedule is flexible, and the trainer is supplied with this responsibility and independence that we would later expect from the trainee.

As can be seen, vocational education and training cannot be a static body, but it must be as dynamic as the economy. We should not forget that the main task of vocational training is to prepare young people for the challenges of working life, to supply the companies with those human resources they need to compete in a global market, and to create jobs that meet the needs of the society.

There is no doubt that the quality of a school based on the vocational training system depends on the expertise of the trainers and teachers. If companies are not willing or not able to take over a more significant role in the qualification of future employees,

then they must be supported by the government to supply them with the staff they need. Otherwise, they cannot compete in the globalized competitive market economy. The interaction between vocational training institutions and industry is an indispensable prerequisite for the development of a successful VET system. Cooperation has to start during the qualification of the trainers and teachers. To wait until they have already graduated and entered the VET institutions is hardly ideal. The creation of models like the Learning-Island will help prepare an environment for more Public-Private Partnership schemes. They can operate effectively for a long time – as long as a win-win situation exists. Under these conditions, the VET System can work properly according to the demands of society and the economy.



# Annex



## Announcement

# International Conference on "Development and Implementation of a Master Degree Standard for Teacher and Trainer Educa- tion in Technical and Vocational Education and Training (TVET) in East and South East Asia"

December, 9th to December 10th, 2005 in the University of Tianjin

**Organized in close cooperation between  
InWEnt – Capacity Building International, Germany,  
the Ministry of Education (MoE), Beijing/China,  
UNESCO-UNEVOC, International Centre for TVET, Bonn/Germany,**

## Background

Referring to the discussions during the UNESCO International Meeting on Innovation and Excellence in TVET Teacher Education held in November 2004 in Hangzhou/China, the organizers of the conference, in cooperation with UNIP (United TVET Network on Innovation and Professional Development), aim to contribute to international discussions and developments concerning the quality of teaching, learning and scholarship in Technical and Vocational Education and Training (TVET). The development and implementation of an international Master Degree Standard in teacher and trainer education in TVET can be deemed a major undertaking in this process.

During the conference various existing Master degree standards shall be examined and discussed against the background of the international Master framework, especially Master degree programmes implemented by the Universities of Tianjin/China, Nanjing/China, Ho Chi Minh City/Vietnam and Magdeburg/Germany, but also Master degree programmes implemented in other East Asian and South East Asian nations, like Indonesia, Korea and Malaysia.

The organizers realize the importance of learning from other experiences and sharing innovations and best practices. Thus, the organizers plan to host a conference on teacher and trainer education in TVET, in order to bring Asian and other experiences together, especially researchers, planners, policymakers and educators. We hope that the conference will contribute to the identification of training needs, based on advanced scientific findings and recent experiences and also contribute to the identification of ways how advanced standards in teacher and trainer education in TVET within the international Master Degree Standard could be implemented under different and changing conditions.

## Objectives

- Presentation of existing master programmes in relation to the new UNESCO international Master framework.
- To improve the quality of national TVET teachers training programmes through the dissemination of the new international UNESCO framework.
- Discussion of necessary accompanying measures resp. up-to-date scientific developments and the impact of the practice of TVET.
- Development of international networking and cooperation in TVET teacher training.

## Conference Outcomes

The following results are anticipated:

- Proposals on the further development of the UNESCO Master framework concerning the structure of vocational disciplines in various fields and a framework curriculum for teacher and trainer education in TVET.



- A recommendation on a draft roadmap for the further development of TVET Master programmes in terms of research capacity building and international cooperation.
- As a tangible result an international publication shall be printed and disseminated documenting the conference contents and outcomes.

## Programme Committee

The programme committee will be headed by Prof. Dr. Zhigang Zhou, Chairman, Tianjin University, China

Members:

- Prof. Zhaojie Xu, Southeast University, Nanjing, China
- Prof. Dr. Zhiqun Zhao, UNIP
- Dr. E. Trowe InWent, Germany

## Scientific Committee

- Prof. Dr. Weiping Shi, UNIP/East China Normal University, Shanghai, chairman
- Dr.-Ing. Joachim Dittrich, UNIP, Bremen
- Prof. Dayuan Jiang, CIVOTE, Beijing
- Man Wey Leung, UNIP/Vocational Training Council, Hongkong
- Prof. Dr. Thai Ba Can, University of Technical Education, Ho Chi Minh City, Vietnam
- Prof. Dr. Jianrong Zhang, UNIP/Tongji University, Shanghai
- Prof. Dr. Zhiqun Zhao, UNIP, Beijing

## Keynote Speakers

- Dr. R. Maclean UNESCO-UNEVOC
- Prof. Dr. F. Rauner, UNIP/University Bremen
- Prof. Dr. Weiping Shi, UNIP/East China Normal University, Shanghai

## Date and Venue

December 9th to 10th, 2005

The conference will be held in the University of Tianjin, China.

**If you are interested in attending this important international meeting, please confirm by 20 October 2005 at the contact for organising the meeting.**

## Call for papers

If you are interested in the objectives we mentioned above, you may write a paper and/or prepare a speech for one of the sessions. The abstract should be sent to us before 20 October so that we can arrange the meeting discussion. The paper should be submitted to us before 1 December 2005. The abstract and paper can be either a Chinese version or English version.

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Web of the conference: <http://202.113.0.248>

<b>Draft Agenda</b>		<b>Comments</b>
<b>Day 1</b>		All day in plenum
09:00 – 10:00	Opening Session <ul style="list-style-type: none"> <li>• MoE</li> <li>• UNESCO Beijing</li> <li>• Government Tianjin</li> <li>• Tianjin University</li> <li>• InWEnt</li> </ul>	
10:00 – 11:45	Keynotes Speeches <ul style="list-style-type: none"> <li>• Dr. R. Maclean (UNESCO/UNEVOC)</li> <li>• Prof. Dr. F. Rauner (UNIP/University Bremen)</li> <li>• Prof. Dr. Weiping Shi (ECNU)</li> </ul>	Presentations to be confirmed. Content related concept: From global to local aspects.
11:45 – 12:00	Photo	
12:00 – 13:30	Lunch	
	<b>Session 1 : TVET Master programmes in relation to the international Master framework</b>	
13:30 – 15:00	Joint TVET Master Programme of Tianjin, Nanjing, Ho Chi Minh City, Magdeburg	Presentations of developing and existing Master programmes for TVET teachers and their relation to the UNESCO international framework curriculum.
15:00 – 15:15	Refreshment Break	
15:15 – 17:00	<ul style="list-style-type: none"> <li>• Other Master programmes, e.g.:</li> <li>• Malaysian TVET Master Programme (Kuittho, Malaysia)</li> <li>• Chinese National Master Programme for TVET Teachers (BUU and Beijing Normal University )</li> <li>• Korea Master Program</li> <li>• ...</li> </ul>	The programme committee will have to decide on proposals.
17:00 – 17:15	Introduction to Day 2	Short introduction into the parallel sessions of day 2

Day 2	Parallel Sessions			
9:00 - 10:30	<b>Session 2: developing the international master framework (UNIP)</b> Parallel working groups: a) Examples from selected vocational disciplines b) Vocational pedagogy	<b>Session 3: recent findings of vocational education (InWent)</b> Parallel/sequential presentation/working sessions. e.g.: a) Educational technology and media in in-service teacher training b) Work process oriented curriculum development for TVET	The number of parallel sessions will be determined depending on the number of participants and of submitted contributions This determines also the number of parallel sessions on vocational disciplines Session 2 focuses on the further development of the UNESCO Master framework. Aim is the definition of general framework curricula for vocational disciplines and for vocational pedagogy	
10:30 - 10:45	Refreshment Break			
10:45 - 12:00	Session 2 a) to b) (continued)	Session 3 a) - c) (continued)		
12:00 - 13:30	Lunch			
	<b>Session 4: Plenum session on future international perspectives in TVET cooperation network.</b>			
13:30 - 15:30	a) Approaches to sustainability, e.g. • Qualification of researchers and lecturers (PhD-programmes, etc.) • Approaches to international knowledge exchange (research cooperation etc) • Capacity Building in Development Partnership (Millennium Development Goal MDG 8) • Towards an Integrated Approach: Development Cooperation and Universities		Output of this session could be a declaration on future development needs	
15:30 - 16:30	Summing-up, agreeing on results			
16:30 - 17:00	Final short statement MoE/InWent./UNESCO/UNIP			

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## UNESCO-UNEVOC International Centre

### Our Profile

The UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training was established in Bonn, Germany, in September 2000, based on a Host Country Agreement signed earlier that year between UNESCO and the Government of Germany. The Centre was inaugurated on 8 April 2002.

The Centre seeks to help UNESCO's 191 Member States strengthen and upgrade their systems of technical and vocational education and training, and to promote a greater availability of skills development options so as to implement Article 26 of the Universal Declaration of Human Rights and UNESCO norms and standards concerning technical and vocational education and training.

The Centre undertakes its activities through a world-wide network of 250 UNEVOC Centres in 158 countries. It creates synergies with UNESCO Headquarters, UNESCO Institutes/Centres and Field Offices; and works in close partnership with other international and national agencies in the field of technical and vocational education and training.

### Our Vision

The UNESCO-UNEVOC International Centre acts as part of the United Nations mandate to promote peace, justice, equity, poverty alleviation, and greater social cohesion. The Centre assists Member States develop policies and practices concerning education for the world of work and skills development for employability and citizenship, to achieve:

- access for all
- high quality, relevant and effective programmes
- learning opportunities throughout life.

The Centre contributes to increased opportunities for productive work, sustainable livelihoods, personal empowerment and socio-economic development, especially for youth, girls, women and the disadvantaged. Its emphasis is on helping meet the needs of developing countries, countries in transition and those in a post-conflict situation.

## **Our Work**

The UNESCO UNEVOC International Centre acts as a key component of UNESCO's international programme on technical and vocational education and training. It also works to support UNESCO's mandate for Education for All and Education for Sustainable Development.

The Centre achieves this through taking action to strengthen and upgrade the world-wide UNEVOC Network (Flagship Programme), with particular reference to:

- Stimulating international and regional cooperation concerning human resource development
- Promoting UNESCO normative instruments and standards
- Promoting best and innovative practices in TVET
- Knowledge sharing
- Mobilizing expertise and resources
- Strengthening partnerships with other relevant agencies

## **InWEnt – Internationale Weiterbildung und Entwicklung gGmbH Capacity Building International, Germany**

InWEnt – Capacity Building International, Germany, stands for the development of human resources and organisations within the framework of development cooperation. InWEnt offers courses that cater to skilled and managerial staff as well as decision makers from business, politics, administrations and civil societies worldwide.

With the education, exchange and dialog programmes for approximately 55,000 persons per year, InWEnt constitutes the largest joint initiative of the German Federal Government, the Länder (German federal states) and the business community. The centre in Bonn and 30 other locations in Germany and abroad employ roughly 850 staff.

The organisation commands a total annual budget of approximately €130 million. The Federal Government is main shareholder and represented by the Federal Ministry for Economic Cooperation and Development (BMZ), which is also the main financial contributor. Approximately 40 percent of the budget is from further commissioning bodies, in particular the Federal Ministry of Education and Research, the Foreign Office (AA), the Federal Ministry of Economics and Technology, and, increasingly, the European Union (EU) as well as various further multilateral organisations. Main cooperation partners are the KfW Bankengruppe (KfW banking group), the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH (German Technical Cooperation) and private business foundations.

InWEnt was created in 2002 through the merger of Carl Duisberg Gesellschaft e.V. (CDG) and the German Foundation for International Development (DSE). In keeping with the tradition of the predecessor organisations, both Länder (German federal states) and German business are shareholders and thus ensure that InWEnt is firmly anchored in society.

Within its business fields, InWEnt amalgamates the decades of expertise and regional experience contributed by CDG and DSE. The methodological repertoire is structured along broad lines, making it possible to customise modules to fit the specific requirements of customers and tasks and provide appropriate solutions. The employment of new media permits the development and implementation of innovative knowledge management methods, the launching of international virtual learning communities and the promotion of multiplier systems.

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