Session 1 - Vocational Education and Training: basics for teaching and research in Vocational Education and Training at universities

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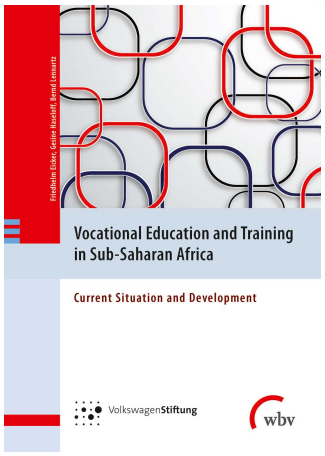

Session 1

von: Haseloff, Gesine; Eicker, Friedhelm; Lennartz, Bernd (Hg.); Papier, Joy; Gessler, Michael; Duncan, Ken; Ogwo, Benjamin A.; Downing, Jillian; Ezekoye, Benadeth N.; Hartmann, Martin D.; D'Oliveira Singo, Brígida; Array

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Session 1 Vocational Education and Training - Basics for teaching and research in Vocational Education and training at universities.

This session highlights the basics of Vocational Education and Training (VET). Each university has its own characteristics. The contributions seek to encourage various forms of VET. Challenges for universities and other institutions are emphasised. The contributions help draw conclusions for the Further structuring of VET in Sub-Saharan Africa. Other country-specific articles from the session concentrate on the characteristics and orientation of VET systems, thereby helping create an overall picture of the status of VET in all participating countries.

The participants endeavored to analyze the current situation of VET in Sub-Saharan Africa by exploring the character and individual design of the current VET systems in the participating countries.

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Session 1

Vocational Education and Training – Basics for teaching and research in Vocational Education and Training at universities

Session 1 started with keynotes by **Peliwe Lolwana** and **Moses Oketch**: *Technical and Vocational Education and Training in Sub-Saharan Africa: the missing middle in post-school education* and *Cross-country comparison of TVET systems, practices and policies and employability of youth in Sub-Saharan Africa*. Both focus on the current situation of school graduates in Sub-Saharan Africa. Session 1 highlights the basics of Vocational Education and Training (VET). Each university has its own characteristics. The contributions seek to encourage various forms of VET. Challenges for universities and other institutions are emphasised. The contributions help draw conclusions for the Further structuring of VET in Sub-Saharan Africa.

Other country-specific articles from the session concentrate on the characteristics and orientation of VET systems, thereby helping create an overall picture of the status of VET in all participating countries.

Joy Papier presents a comparative study of the TVET Systems in **Cameroon**, **Egypt**, **Ghana**, **South Africa and Tanzania** in her paper *Re-Casting Technical-Vocational Education*. She touches on teacher education and Further Education as well as modalities for the trainees. The article highlights the importance of TVET and TVET personnel for economic development in all five countries. According to Papier, greater commitment is needed for successful development.

In their article *Dual Vocational Education and Training Systems in Europe: Lessons learned from Austria, Germany and Switzerland*, **Waldemar Bauer** and **Michael Gessler** present experiences from the dual VET system in **Austria**, **Germany** and **Switzerland**. Illustrating the different structures and organisation of the dual systems, the paper connects education, employment and the implications thereof for trainees on the labour market.

The article *Developing Lecturers at VET Institutions through Engagements with Industry: the South African Experience* by **Ken Duncan** discusses a recent initiative in **South Africa**, which aims to develop the technical and educational skills of university and college lecturers through cooperation with industry. The paper identifies the barriers that exist between training and the world of work. In addition, it shows how both sides can profit from an exchange.

Benjamin A. Ogwo argues in his paper *Models of university-based Further Education Programmes (FEPs) for Vocational Education and Training practitioners and the economic development of Sub-Saharan Africa* that the training at universities in **Sub-Saharan Africa** fails to meet the requirements of the labour market. He discusses four models of FEPs. Ogwo concludes that none of the models presented is able

to solve VET problems of Sub-Saharan Africa single-handedly and recommends a new, integrative approach that combines the models.

In *Applied Learning design in an online VET teacher-education course: A pedagogical framework that responds to the needs of mature-aged, employed students VET teacher-education in Australia*, **Jillian Downing** illustrates the experiences of the University of **Tasmania** in **Australia**. The paper discusses online VET teacher education with the focus on applied learning. The learning design principles and activities presented draw an authentic connection between theory and practice.

In her paper *Paradigms for Networking Universities and VET Institutions on CBET in Sub-Saharan Africa*, **Benadeth N. Ezekoye** describes the experiences of implementing networked CBET in **Nigeria**. She states the aims, strategies and structures of networks, including IT solutions. The article advocates a network between universities and the economy – with joint responsibilities and advantages for both sides.

In his article *Theory and Method of Reflection Levels – Its use in VET,* **Martin Hartmann** from **Germany** propounds the principles of his theory of reflection levels. The article emphasises that meaningful learning can only be planned if it is understood how trainees learn. Hartmann explains how the levels of reflection can be identified in complex processes from work and learning in companies and schools. The bottom line is that learning during training can only succeed if theory and practice are integrated. His article gives relevant examples.

Based on a recent study, in her article *Further Education for Technical Vocational Education and Training at Pedagogical University, Maputo,* **Brigida Oliveira Singo** reports on the challenges in TVET teacher education at the Universidade Pedagogica in **Mozambique**. She discusses the introduction of a model of extra-occupational teacher training that was developed with the support of international partners.

Gesine Haseloff presents a shaping competence-oriented Further Education sys, - tem in her article *The 'Train the Trainer-System' – Results of a research and development project for and with VET pedagogues in Sub-Saharan Africa*. The VET-Net project between **Germany, Ethiopia, Mozambique** and **South Africa** serves as the starting point. Taking the various initial qualifications of the programme participants into account, the model offers an extra-occupational education, flexible study times, free choices of modules and degrees from bachelor to master.

In his article *Fundamentals of the development of Vocational Education and Further Education of VET Pedagogues in Sub-Saharan Africa*, **Friedhelm Eicker** elaborates on the basics of Further Education in Vocational Education. Taking a constructivist basic position and scientific theory as his starting point, he illustrates his ideas on a concept for shaping competence-oriented VET. He explains in his article why shaping competence and networking leads to innovative and effective VET.

A comparative study of TVET in 5 African Countries with a specific focus on TVET Teacher Education

Joy Papier

Abstract

This article describes a five country (Cameroun, Egypt, Ghana, South Africa, Tanzania) study of 'TVET Teacher Education in Africa' that was commissioned in terms of an EU-South African collaboration in 2013[1]. While the focus was on vocational teacher[2] education, the contextual realities of each country's vocational systems was studied as this would impact on every aspect of vocational teacher development, for instance, what teachers would have to teach, who the students might be, how students would be expected to learn, available funding for Vocational Education and so on. Comparisons were therefore made over a range of elements that included the systems in place for vocational training, systems of vocational teacher education, and the modalities for training of VET teachers.

It is clear from the study that there has been recognition over the last ten years or more of the potential of Technical and Vocational Education and Training (TVET) for economic upliftment, poverty alleviation and improving employability, particularly for out of school youth and adults. There was evidence in the study of wide-ranging policies aimed at, inter alia, reform of TVET institutions, funding mechanisms, and TVET curricula, albeit that policies are at various stages of implementation. Concomitantly there has been acknowledgement of the role of teachers or trainers, and strategies for the development of competent TVET educators including new professional qualifications specifically for vocational teachers.

The study aimed to share knowledge of TVET systems across the five countries, within which vocational teacher development is taking place. In addition it drew on

1 EU, 2014, TVET teacher education in Africa. Synthesis Report. [Online] Available at: ec.europa.eu/education/library/reports/tvet-africa-report_en.pdf. Information for this article has been extracted from individual country reports by the writer, who was a member of the international report writing team and is an expert researcher on South African TVET.

2 Those who teach in vocational contexts are referred to, in the countries in this study, as TVET educators, vocational teachers, trainers, TVET practitioners, and college lecturers. These various terms were used interchangeably.

European member states' experience of vocational teacher training as examples of practice which may inform new policy initiatives that are envisaged. In its attempt to revitalize TVET on the African continent, the African Union Commission is presently trying to disseminate and advocate its Continental Strategy for TVET under the broader rubric of the Continental Education Strategy for Africa released in 2016. It is hoped that the comparative study described in the body of this article contributes to this endeavor.

Introduction

This paper is based on a five country study (Cameroun, Egypt, Ghana, South Africa, Tanzania) that was commissioned in terms of an EU-South African partnership in 2014. The study aimed to share experiences of good or emerging practices across the five countries as well as draw on European member states' experience, in order to inform policy dialogues on the continent that are attempting to re-cast and invigorate TVET. While the focus was on vocational teacher education, the contextual realities of each country's vocational systems was studied as this would impact on every aspect of vocational teacher development, for instance, what teachers are required to teach, who the students might be, how students would be expected to learn, available funding for Vocational Education and so on. Comparisons were therefore made over a range of elements that included the systems in place for vocational training, systems of vocational teacher education, and the modalities for training of VET teachers.

Using a multi-pronged methodology for the study, a country expert in each of the five countries prepared a country report based on a common set of questions that were to be addressed. Information for the questions was gathered through interviews with role-players and stakeholders in the vocational field, as well as the study of policy documents and empirical papers. Individual country reports were then submitted to a writing and review team who analysed the data thematically and compiled a composite report.

Country reports on Vocational Systems in Africa

This aspect of the study outlined key characteristics of the TVET system and its relationship to other educational sectors in each of the five countries under review

TVET systems

Technical Vocational Education and Training (TVET) in the five African countries was found to be located mainly at the secondary school level, extending into Higher Education levels. TVET provision was small in comparison with other education sectors, and was generally perceived to be a second choice option for school leavers and parents in relation to general education that provides routes to university.

There was strong evidence of recent policy development and legislation in TVET, and recognition in policy of TVET as a key driver of education and training that addresses skills development and unemployment. However, fragmentation of TVET systems across national departments is a feature of most countries, examples of which are set out below.

Public TVET in Cameroun is provided by three Ministries of Education: a Ministry of Secondary Education (MINEDUC), a Ministry of Employment and Vocational Training (MINEFOP) and the Ministry of Higher Education (MINESUP). In addition 14 other government ministries also make provision for TVET related to human resource development within their specific sectors. The country review notes that TVET is not centrally coordinated at a national level in most instances, with a few exceptions. Egypt for instance established a dedicated Ministry for TVET in 2015 to overcome fragmentation of the TVET system. Prior to this, the Ministry of Education was responsible for the majority of TVET provision together with the Ministry of Technical Education and Training. As this is a transitional period for TVET in Egypt, governance of TVET is still fragmented across numerous government departments and agencies. In 2012, Ghana amended the Council for Technical and Vocational Education and Training Act (COTVET) to provide a legal basis for the establishment and implementation of a national TVET Qualifications Framework and a Recognition of Prior Learning Policy. South Africa created a government ministry, the Department of Higher Education and Training in 2009, which includes adult education, TVET, workplace training and Higher Education. More recently, TVET has been transferred from a provincial mandate to a national mandate within the same Department as universities. Finally, in 2008, Tanzania consolidated its Vocational Education and Training Authority and National Council for Technical Education under the Ministry of Education and Vocational Training.

TVET provision is increasingly being aligned to outcomes-based and competency-based education quality assurance approaches and three countries are in the process of establishing a national qualifications framework (NQF) for TVET. South Africa has an existing NQF with three sub-frameworks within which Higher Education qualifications, TVET qualifications and occupational qualifications are located. Each of the five countries has developed strong international linkages to improve TVET systems. While many of these are related to international donors, there is also evidence of involvement in regional qualification frameworks and benchmarking TVET programmes to international standards.

Financing of TVET

Financing of TVET systems varies across countries and generally TVET funding is considered to be inadequate, ranging from around 1% to 4% of the national budgets. The majority of funding is provided through state fiscus, supplemented by student fees, albeit set at minimal levels. Most countries also show substantive donor funding for TVET projects but there is limited investment from the private sector. Recent, accurate data on TVET expenditure, enrolments and throughputs

are not readily available. South Africa and Tanzania currently have a 1% and 2% skills levy respectively on employers which is a training tax and contributes towards a national skills fund. In South Africa around 2.1 billion was allocated by treasury in 2014 for bursaries to TVET students.

Reports from all five countries raise concerns that current financing of TVET is insufficient for policy and developmental aims to be realised.

Policy Initiatives

Recent policies aimed at TVET in the reviewed countries reveal an increasing focus on competency based education and training approaches for TVET provision, workplace orientation for teachers and students, as well as capacity building interventions for teachers, many of which are donor driven.

In Ghana for example, emphasis has been placed on the introduction of Competency Based Training and workplace experiential learning. Donor funding has been used to identify demand-driven approaches to employability of TVET graduates and the use of new technologies. Another donor funded project is providing infrastructural support for TVET teacher training and upgrading competencies of faculty staff. In South Africa, the White paper on Post-School Education and Training (2013) aims to expand TVET enrolment to 2.5 million students by 2030 and a TVET lecturer education policy with minimum qualification requirements was released in 2014, resulting in universities engaging in development of new TVET specific qualifications for TVET college lecturers. In Tanzania, ICT and E-learning is seen as important interventions to improving access to TVET and there is a focus on re-introducing apprenticeship schemes and part-time modes of delivery.

TVET is seen as a key policy priority for each of the countries under review, although they differ significantly with regard to implementation of these policies. Recent policy reforms have been strongly influenced by international partnerships and donors, however, the African Union has been active for more than a decade in attempting to raise the profile of TVET on the African continent, as its 'Continental Strategy for TVET: To foster youth employment' indicates. TVET systems overlap with other educational sectors, government ministries and agencies, which make national coordination difficult, and a key focus of policy currently is to harmonise and bring coherence to TVET.

TVET Teachers — common themes

Country reports revealed cross-cutting themes with regard to TVET teachers, who in their own view have lower status than general school teachers, and are poorly remunerated compared with their industry counterparts. Vocational Education is still stigmatised as a 'second choice'/easier option for students who could not succeed in the academic track, and students expect to do more practical work in vocational programmes. TVET teachers thus have to cope with a range of learning

needs and student expectations in their classrooms which they have not received adequate preparation for.

General vocational teachers, for example those who teach foundational subjects such as language, mathematics or science, still experience a historical division from workplace related technical instructors or trades teachers. However, new policies on vocational teacher development appear to be bringing these two categories of vocational teachers into the same qualification pathways.

Initial teacher education is still strongly geared towards training of school teachers, even where institutions in Ghana and Tanzania for instance, are for training of TVET teachers. Only SA has gazetted new norms and standards dedicated to TVET teacher training through qualifications which, though not implemented as yet, take into account the specifics of Vocational Education and Training and differentiate general school teachers from teachers in TVET institutions. TVET teacher education is largely within the domain of university faculties of education, except for the MVTTC in Tanzania which is a general vocational teacher training college (as distinct from a Technical education teacher who is occupation focused), and the ENIETs in Cameroun.

The career pathways for a TVET teacher across the countries in the study are mostly undefined and confusing at present, with old or general teaching qualifications being phased out, or existing qualifications which are still focused on general academic teacher development. Vocational teacher training programmes do not clearly define a 'professional TVET teacher', apart from South Africa's policy on TVET teacher qualifications which signals a 'vocational pedagogy' for TVET teachers.

Workplace exposure or industry training is not yet a structured part of TVET teacher training, even though countries like Egypt and Tanzania recognise that this is desirable particularly for technical and practical instructors. In South Africa an external agency has been securing workplace opportunities for TVET college students and lecturers utilising donor funding, but this will still need to be taken to scale by becoming systematised and nationally funded. There was no evidence of organised industry involvement in the design of TVET or TVET teacher education programmes in the countries in the study.

Country reports point to instances of international cooperation around teacher development but there was not much evidence of internationally benchmarked TVET teacher qualifications. Furthermore, the local research base on TVET teacher education is still underdeveloped or emergent.

Teacher training practices in EU contexts

The following section highlights practices in EU contexts that may be informative for emerging policy on TVET teacher development elsewhere.

- Flexible entry for industry professionals into TVET teaching. For example, in the Netherlands, colleges evaluate industry professionals who have minimal teaching competence and they are able to commence teaching in the college

while obtaining a pedagogical certificate. The advantage of this is that the recent workplace experience and expertise of the entry level teacher is utilised in the college, while building professional teaching competence as well.
- Colleges have more autonomy to appoint their own staff, thus colleges can attract the kind of expertise that they need without official delays or barriers to appointments.
- In Sweden, continuing professional development is available for in-company trainers through online courses in pedagogy.
- Companies are incentivised to up-skill trainers, making teaching attractive, and these trainers could then become teachers in vocational colleges as well.
- In the Netherlands there is close cooperation between TVET teacher education and TVET schools, which enables the needs and expectations of both institutions to be taken into account.
- In Ireland new teachers are given mentoring and support by experienced colleagues, providing a bridge into their teaching career.
- In Finland vocational teachers are placed with employers in the workplace to enable continuous updating of teachers' industry knowledge.
- Denmark has an innovation fund for special projects which improve teachers' practices. Teachers are also viewed as change agents and are encouraged to reflect on their own practice.

In sum, these vignettes of international practices indicate an emphasis on strengthening industry involvement in TVET; on improving labour market information systems; on feedback loops between TVET colleges and teacher education providers; on continuing professional development for updating of TVET teachers industry skills and competences; and of giving TVET teachers some agency in their own education and in curriculum development at a policy level.

Conclusion

This article of limited scope has provided an overview of how TVET is organised and supported in 5 African countries. There is evidence in each of the country reports of increased levels of policymaking in TVET, based on a recognition of the potential of TVET for skills development towards poverty alleviation and building sustainable livelihoods. However, TVET still occupies a comparatively tiny slice of the national budgets, and is regarded as under-funded for the role it is being encouraged to play. Negative perceptions and stereotypes of TVET students and practitioners still prevail, and significant steps will have to be taken to eradicate these, largely by addressing issues of quality and attractiveness of TVET. While policy is attempting to bring about systems coherence in TVET, there is still much fragmentation of responsibility and reporting, resulting in poor data and accountability.

With regard to TVET teachers, this is a sector of the teaching cohort which is still finding its identity as training of vocational teachers has mostly been modelled on

school teacher training to date. In South Africa a new suite of qualifications specifically for developing TVET teachers has been developed, and will take some time to be fully implemented, however the policy recognises the unique identity of TVET teachers and the relationship they should have with industry. TVET teachers of the future will be required to be trained in pedagogy, in their subject knowledge, and have industry exposure/experience. This will assist in building respect for industry knowledge as well as academic knowledge relevant to TVET. Principles and practices that have been gleaned from international EU contexts illustrate strong industry-TVET college-TVET teacher training interrelationships, and demonstrate the positive recognition and esteem that TVET professionals enjoy in their teaching career. While only a few examples could be accommodated herein, they show the kind of cooperation which will be necessary to establish and enhance TVET and TVET teacher education systems in order that the aspirations for TVET may be realised.

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Dual Vocational Education and Training Systems in Europe: Lessons learned from Austria, Germany and Switzerland

Waldemar Bauer
Michael Gessler

Abstract

Due to economic crisis and high youth unemployment, skills development is a priority field in many countries. This is related to the considerable interest on the part of policy makers, and the close links between VET, economic strength and the social issues associated with employment. The current debate has caused an increasing international interest in the dual system in Europe and triggered a trend to transfer such VET systems, or parts of it, to foreign countries. In a comparative perspective, three dual models in Europe with a long tradition have been analysed (Austria, Germany and Switzerland). In our overviews, we have added two more countries: Netherlands and Norway. Because of the limited space, these countries are not covered in the in-depth analyse. The following dimensions have been derived: structure and governance of the Dual VET System. The comparison shows that Dual Systems can have different configurations: legislation (integrated/separated), role of the politics (unified/divided), competent bodies on the regional level (state/economy), representatives of the working world (social partners/professional associations), subsidies (yes/no), intermediate organisations (yes/no), vocational education and Higher Education (permeability/barriers) and training costs (benefits/loss). We can conclude from these observations that two different types of Dual VET Systems can be identified: An (1) unified Dual VET System under state responsibility with shared competence between state and economy (e.g. Switzerland) and a (2) divided Dual VET System under state responsibility but mainly directed by the economy (e.g. Germany).

Introduction

The purpose of this study is to examine those variables that most define and influence the characteristics and apparent success of dual VET systems. Hence, the analysing and comparing "VET systems" is a desideratum, but systematisation approaches are recent phenomena and suitable comparative methodologies have not been clarified in the international research community, yet (Grollmann, 2008). A comparative study of VET in different countries needs to consider broader social and political contexts, as well as the relationship between elements of the VET systems and their relationship with the education systems. VET systems are an expression of national traditions, social and cultural values and behaviour, economic and industrial structures, and political preferences and directions.

There are different attempts to classify VET systems. Raffe (1993) classified post-compulsory education and training systems (initial VET) into three types: provider-based systems that are characterised by a dependence upon education and training systems to provide entry-level skills for workers, work-based which leave the responsibility largely to industry or the workplace and mixed models that combine the two approaches. Other typologies use government intervention in education and training to systematise VET models and as the main criterion the "role of the state". Greinert (1988) distinguished three systems of VET: the market model, the scholastic model and the mixed model or dual system (state-regulated market model). The limitation of applying the concept VET system as *tertium comparationis* and the concentration on the macro-level of Vocational Education as mainstream are stated (Grollmann, 2008). Multi-level or multi-dimensional approaches are also discussed in literature; they include the didactical-curricular focus (micro level) and the learning environment or location and thus considering the learning or apprenticeship culture (e.g. Deißinger, 2004) These qualification styles may be named enterprise specific, knowledge-oriented and vocationally oriented.

As a consequence, the challenge in comparative VET research is the adequate dimensioning of various VET models considering socio-cultural, historical, political, economic and educational factors or variables. With respect to the topic of the paper, there are some empiric studies and other analysis. Rauner (2008) has analysed different dual (and other) VET systems focussing on the governance with two dimensions (integration of system and input-output). Euler (2013) listed eleven essential elements of Germany's dual system, which represent the key characteristics and analytic perspectives for transferring purposes. In another new publication from Austria (Petanovitsch, Schmid & Bliem 2014) seven success factors (such as social partnership; occupation-based VET approach; benefits for companies; attractive VET pathway for young people) have been identified for setting up a dual VET system in a successful and lasting manner. Reflecting the general methodological considerations and the specific studies in this comparison of dual approaches, the following dimensions have been derived: configuration of VET system, linkage of VET and education system and policy and governance of VET system. In a comparative perspective, three dual models in Europe with a long

tradition have been analysed (Austria, Germany and Switzerland). In our overviews, we have added two more countries, the Netherlands and Norway since these countries have dual systems, too, but with different organisations. Because of the limited space, these countries are not covered in the in-depth analyse.

Economic situation

Typically, dual systems are strongly related to the economic sector, because of the involvement of business. In order to illustrate this relationship, the following table provides an overview of the economic situation in the different countries by comparing the Gross Domestic Product (GDP) per capita and the unemployment rates (table 1).

The lowest youth unemployment rate can be found in Norway, while the smallest discrepancy between the total unemployment rate and the youth unemployment rate (for persons 15−24 years of age) exists in Germany (factor: 1.56). These data were also recognised by the OECD, which stated that "youth unemployment certainly tends to be less often a problem (relative to adult unemployment) in countries like Germany with strong 'dual' apprenticeship systems" (OECD, 2010: 34).

Tab. 1 Selected economic data

	Austria	Germany	Netherlands	Norway	Switzerland	OECD
Population (in thousands)	8,469	80,896	16,804	5,137	8,140	1,256,637
GDP per capita (in US Dollar)	45,133	43,282	46,749	65,635	56,897	37,815
Unemployment rate	5.9 %	5.4 %	7.2 %	3.3 %	4.5 %	7.5 %
Youth unemployment rate	10.6 %	8.4 %	12.4 %	8.2 %	8.6 %	15.5 %
Unemployment Discrepancy Factor	1.80	1.56	1.72	2.49	1.91	2.07

Source: OECD, 2015a; OECD 2015b; OECD 2016

The reason for the low youth unemployment rate seems clear: if the education system and the employment system are structural linked, the individual transition is much easier than it would be if the two systems were not linked or if they were opposite to one another. Another factor behind the low youth unemployment rate must also be recognised: the GDPs of the aforementioned countries are all higher than the OECD average. Such a strong economic situation tends to favour low unemployment rates.

Education System

Since VET system are strongly embedded in education systems, some basic characteristics such as the duration of compulsory education and the placement rates in dual VET programmes are described in this section.

Austria

In Austria compulsory schooling starts at the age of six and lasts for nine years. There are two types of schools at secondary lower level (lower secondary schools and academic secondary schools lower cycle). Then children can choose between two pathways, a vocational training track (vocational colleges, vocational schools and apprenticeship training) and a general education track (secondary academic school). About 40 % (120,000) of every age group in Austria are trained in legally recognised apprenticeship occupations in the dual system, another 40 % opt for a VET school or college, and 20 % continue at secondary academic schools.

Germany

The duration of compulsory (general) education in Germany is, in most German states (*Länder*), 9 or 10 years. General and Vocational Education in Germany is regulated on the regional level of the 16 states (*Länder*) as opposed to the federal level (there nonetheless exists a ministry of education on the federal level). Thus, the duration of compulsory education in the various states is not identical. Schooling normally begins at the age of six, and students are either 15 or 16 years old upon completion of their lower secondary education. In most German states, an additional three-year, compulsory, upper secondary education programme begins after this phase. Upper secondary education can be conducted either in general education or Vocational Education programmes; the latter is referred to as "compulsory Vocational Education". We can conclude, however, that there is generally an obligation to attend an upper (general or vocational) secondary education programme.

The percentage of students in upper secondary education, as categorised by programme orientation, expresses the important role of Vocational Education and Training. This figure specifically highlights the important role of the dual approach within Vocational Education and Training programmes: 52 % of students in upper secondary education attend general education courses and 48 % are enrolled in a vocational programme. Of this 48 %, 41 % take part in a combined school-based and work-based dual programme (OECD, 2015c, p. 317).

Switzerland

As in Germany, the education system in Switzerland is regulated on the regional level of the 26 cantons. Nevertheless, the duration of compulsory education is 11 years across the various cantons. Schooling begins at the age of four with kindergarten, and students are typically 15 years old upon completion of their compulsory education programme. In Switzerland, enrolment in an upper secondary education programme is not obligatory; however, if an apprenticeship contract is signed, the student must attend vocational school. In Switzerland, the state defines the rules for upper secondary education, and the various cantons are responsible for operating their schools within the framework established by the state government.

The percentage of students in upper secondary education, as categorised by programme orientation, expresses the superior role of Vocational Education and Training. This figure especially conveys the important role of the dual approach within Vocational Education and Training programmes: 34 % of students in upper secondary education attend general education courses and 66 % are enrolled in a vocational programme. Of this 66 %, 60 % take part in a combined school-based and work-based dual programme (OECD, 2015c, p. 317).

Tab. 2 Education System

	Austria	Germany	Netherlands	Norway	Switzerland
Political regional unit	9 Länder	16 Länder	19 provinces	19 counties	26 cantons
Start of Schooling	6 yrs.	6 yrs.	4 (or 5) yrs.	5 yrs.	4 yrs.
Duration of basic compulsory education	9 yrs.	9–10 yrs.	12 yrs.	10 yrs.	2 yrs. compulsory education in kindergarten + 9 years in school
Regulation following lower secondary education	1 yr. in pre-vocational or upper cycle in secondary school	Additional 3 yrs. of compulsory education	Compulsory education to 18 yrs.	Statutory right for additional 3 yrs. upper secondary education	Non-obligatory education
Percentage of students in upper secondary education by programme orientation*	GE: 30 % DV: 34 % SV: 36 %	GE: 52 % DV: 41 % SV: 7 %	GE: 30 % DV: 18 % SV: 52 %	GE: 48 % DV: 15 % SV: 37 %	GE: 34 % DV: 60 % SV: 6 %

* *GE=General Education, DV=Dual VET, SV=School-based VET, source: OECD 2015c: 317 (Austria, Germany, Norway, Switzerland); OECD 2014: 314 (Netherlands)*

The education system provides the framework and context for all VET programmes. The following section will provide a closer look at the structure of dual programmes.

Structure of the Dual VET System

One characteristic of dual programmes is the involvement of companies, which are usually responsible for the apprenticeship. In the traditional dual system, apprentices are attending vocational schools in addition to the in-company training. The root of this apprenticeship is based in medieval history, when guilds of craftspeople and artisans organised their sectors and regulated the educational and training process of becoming a journeyman and master. In the 19th century, additional vocational schools were established due to societal and educational policies. Apprentices were obliged to attend these new schools in order to expand their general education. Later, proper vocational subjects were implemented in those school types. This is the origin of the dual principle, which traditionally is based on the idea of conducting practical training in the company and imparting theory (and general education) in the school. In the case of Germany, the system was unified in a large conference in 1920 representing the current structure. Approximately in this period, the industry has started systematic training, too. Most dual

systems in German speaking countries are based on a similar tradition and structure, however regulations and governance differ. The different dual models are described in this section.

Austria

The dual training in Austria is an apprenticeship programme that encompasses two learning venues, the company (80 % of learning time) and the vocational school (20 % of learning time) with a 2−4 years training period. Training is based on more than 200 legally recognised apprenticeship occupations (*Lehrberufe*) in trade, commerce and industry, as well as in agriculture and forestry. The legal bases are set out in the Vocational Training Act (*Berufsausbildungsgesetz* − BAG). The Ministry of Science, Research and Economy (BMWFW) issues these training regulations as ordinances.

Training regulations contains the occupational profile, a training plan, which is a sort of a curriculum for the training company describing occupational skills and knowledge by training years to be achieved, and regulations for examination. For newly regulated apprenticeship occupations, activity descriptions are formulated, which lay down the occupational requirements the trained apprentice is able to meet. The national training regulations ensure a uniform minimum standard of training. Currently around 35,000 companies are involved in the apprenticeship scheme (ibw, 2014).

Enterprises provide training on a voluntary basis and at their own expense. Apprentices and employers sign an apprenticeship contract that forms the basis of vocational training in the dual system. Apprentices are obliged to attend VET school, either in day-release (1 or 2 days per week) or in block release (e.g. 6 weeks). The apprenticeship contract is submitted to the Apprenticeship Office, the regional competent body of the economic chambers, for recording purposes, who is also checking the suitability of the training company. The apprentice receives a remuneration by the company, which is fixed in collective labour agreements and varies according to the different apprenticeship trades (up to 80 % in the last year). The costs of apprenticeship training reduce the enterprise's taxable profits. There are some subsidisation options for apprenticeship training. Apprentices have full social insurance including health, accident, retirement and unemployment insurance.

At the end of the training period, the leaving or apprenticeship examination (*Lehrabschlussprüfung* − LAP) can be taken. This exam aims to test whether the candidate is able to appropriately carry out the activities necessary for the occupation. The exam comprises a practical and a theoretical examination (can be the prove of successful completion of the part-time vocational school). The exam committee comprises employer and employee representatives. The exam is organised by the regional economic chambers. A specific feature of the Austrian dual system is the double apprenticeship (*Doppellehre*); apprentices can achieve two similar occupational qualifications at the same time.

The additional curriculum of part-time vocational school is equivalent to the training regulation. The aim of part-time vocational schools for apprentices is to provide apprentices with the theoretical basics of the respective occupation to promote and complement company-based training and to deepen their general knowledge. The focus of education at part-time vocational school is on occupation-oriented specialist instruction (with about 65 %); general subjects make up some 35 % of the schooling period. Specialised instructions also include practical training in workshops and/or laboratories. The main criteria when it comes to defining the subject matter is its contribution to the improvement of the students' understanding of the real world and of the gap between legitimate claims and reality as well as the representation of Austria's political, cultural, economic and humanitarian achievements (ibw, 2014). Another special feature is related to the permeability of educational pathways. Graduates of apprenticeship training (and of other full-time VET schools) have the possibility to take the vocational matriculation examination (so-called *Berufsreifeprüfung*), enabling young people to combine the apprenticeship and upper-secondary school leaving examinations. This examination permits unrestricted access to Higher Education and universities.

Germany

The German dual model consists of alternating school-based courses (one to two days per week) with company training (three to four days per week). The duration of such programmes can be between one and 3.5 years and depends on the required level of knowledge and experience for an occupation. The standard duration, however, is 3 years.

A school leaving certificate is not necessary to enter the dual VET system. Rather, a signed apprenticeship contract with a company is sufficient. Nevertheless, only 2.9 % of all new apprentices do not possess a school leaving certificate. In comparison, 26.2 % of all new apprentices have already earned a high school certificate (and are therefore eligible to enter Higher Education), while 70.9 % possess a middle school degree (BIBB, 2016, p. 161).

In 2015, 804,369 German persons wished to enter into the dual system, but only 522,039 contracts were offered; thus, 64.9 % of applicants were successful (BIBB, 2016: 12). This problem has, unfortunately, existed for a considerable period of time. In the 1970s, with the motivation to improve the situation, parallel state financing was approved and the school-based VET programme was established as an alternative for young persons, who did not have the opportunity to earn a contract (Büchter, 2013). This "system for integration" or "transition system" has various purposes: students can (1) receive a general education school leaving certificate within the vocational programme; (2) upgrade an existing general education school leaving certificate within the vocational programme; or (3) try to gain a partial qualification in the hope that it will be taken into account if they are later granted a contract. Such recognition of prior learning, however, does not typically occur, and thus time spent within the programme is often wasted. Students are

regularly "parked" in the so-called "system for integration", which is less a system for integration than a system to hide the disintegration of individual groups (Greinert, 2003).

In 2015, 480,674 apprentices started an apprenticeships in the dual system (49.81 %); 204,174 apprentices attended a school-based VET programme (21.16 %), 9,350 were enrolled in a public VET programme (0.97 %) and 270,783 were placed in the transitional system (28.06 %). The discrepancy between people who successfully managed the transition (71.94 %) and individuals who were not able to manage the transition (28.06 %) is more than double than in Switzerland (12.4 %) (BIBB, 2016, p. 239).

In Germany, there are roughly 330 occupations that require dual vocational training regulated by the Vocational Training Act of 1969, which was updated in 2005 (BMBF). The federal authority that develops the training regulations together with the social partners is the Federal Institute for Vocational Training. The programmes are differentiated and oriented according to work requirements, however not all occupations are regulated by the Vocational Training Act or the Federal Institute for Vocational Training. For example, all occupations in the healthcare sector are regulated by special laws. Such healthcare sector programmes are also dual based, demanding a combination of theoretical and practical education; however, the employer, who is responsible for the practical education, typically also offers the theoretical education in schools owned by the organisation. The healthcare sector also offers one-year vocational programmes (e.g. nursing assistant courses). The Vocational Training Act, in contrast, requires a minimum of two years training (BMBF, 2005, p. 5).

Apprentices receive salaries from the outset of their programme. Basically, remuneration is based on the collective labour agreement in the sector, but depends on some factors such as the sector, the size of the company, occupation and years spent in the VET programme. Salaries range from 400 Euro per months in the first year (e.g. for a hairdresser) to 1.400 Euro per months in the final year (e.g. for a carpenter). On average, the salary of an apprentice is 62.1 % of the salary for a skilled worker (Muehlemann & Wolter, 2014, p. 13).

Switzerland

The Vocational Education and Training System is clearly structured and can be differentiated on various levels: (1) transition options, (2) two-year VET programmes for the Federal VET, (3) three-year or four-year VET programmes for the Federal VET Diploma, (4) the Federal Vocational Baccalaureate and (5) the University Aptitude Test (SERI, 2016, p. 7).

- Transition options (Level 0): These programmes are designed for individuals "who have been unable to immediately transition to [the] upper-secondary level. Such options include practical training and pre-apprenticeships and are generally designed to prepare young people for enrolment in VET programmes" (*ibid*).

- Two-year VET programmes for the Federal VET (Level 1): This programme prepares individuals for specific but simple occupations. These shorter programmes are especially designed for people with more practical skills. Apprentices who complete this programme can continue onto the next level. Achieved competencies are recognised, and thus the two years are not wasted if the student wishes to pursue a higher degree.
- Three-year or four-year VET programmes for the Federal VET Diploma (Level 2): This programme prepares individuals for specific and complex occupations. Apprentices within this programme can earn a Federal VET Diploma and an additional Federal Vocational Baccalaureate.
- Federal Vocational Baccalaureate (Level 3): Apprentices who are enrolled in a three-year or four-year VET programme for the Federal VET Diploma have the option to attend preparatory courses that cover general education subjects for the Federal Vocational Baccalaureate examination. The Federal Vocational Baccalaureate offers the possibility to continue education at a university of applied studies. Students also have the option of sitting for a University Aptitude Test (UAT).
- University Aptitude Test (Level 4): Apprentices with a Federal Vocational Baccalaureate can prepare for another examination, the University Aptitude Test. After passing this exam, apprentices have the option to enrol in a cantonal university or a federal institute of technology.

Within the different levels, the system is permeable and offers clear access and connection to Higher Education at universities. Nevertheless, 12.4 % of students cannot manage to acquire an apprenticeship contract after completing lower secondary education and thus pursue alternative transition options. This also means, that 87.6 % of students manage to earn an apprenticeship contract. After completing lower secondary education, 26.5 % move on to a baccalaureate school or specialised school on the upper secondary level (SERI, 2016, p. 11). This may be the result of free choice or might signify choice under pressure due to the unavailability of apprenticeship contracts.

Apprentices receive salaries from the outset of their programmes. The salaries for Swiss apprentices are lower than those granted in Germany. On average, the salary of an apprentice in a three-year programme is 50 % of the salary for a skilled worker; for apprentices in a four-year programme, the salary is 46 % (Muehlemann & Wolter, 2014, p. 13).

Tab. 3 Structure of the VET programme

	Austria	Germany	Netherlands	Norway	Switzerland
Entry requirements for a Dual VET	Signed apprenticeship contract with a company and 9 years of schooling. The training contract is registered by the apprenticeship office of regional Economic Chamber.	A signed apprenticeship contract with a company. A school leaving certificate is not required. The training contract is proofed and registered by the competent body (usually chamber).	VMBO diploma is required for admission to MBO levels 2 to 4. Contract with employer for BBL pathway.	School leaving certificate from lower secondary education.	A signed apprenticeship contract with a company. A school leaving certificate is not required. The training contract has to be approved by the cantonal VET office.
Duration	2–4 years	1–3,5 years	2–4 years	4 years	2–4 years
Dual Model	Alternating (1–2 days at school and 3–4 days at a company) or different organisation (6–8 week course block)	Alternating (1–2 days at school and 3–4 days at a company) or different organisation (6–8 week course block)	Alternating, work-based programme (BBL) at least 60 % in company, and the rest in VET college, day release (4 days in company, 1 day school), or block release	Sequential (2 yrs. of full-time schooling + 2 yrs. of full-time apprenticeship).	Flexible: (1) alternating (1–4 days at school and 4–1 days at a company), (2) digressive or (3) one year of full-time schooling in combination with alternating education and training in the following years.
Transition problems	No data available, probably not an issue.	In the beginning, students without a contract can move into the "system for integration" or the "transitional system". (28 % of a VET cohort).	In the beginning: students without contracts can choose other learning pathways in MNBO.	Transition problems occur between the 2nd and 3rd yr. Students without a contract can continue schooling.	In the beginning, students without a contract can move onto "transitional offers" (12.4 % of a VET cohort).
Occupations	220	330	More than 600 diplomas and qualifications in MBO (in reform)	180	230
Status of apprentices in the company and salary	In accordance with collective labour agreement for skilled worker up to 80 % of (last year).	Training contract in accordance with collective labour agreement for skilled worker (average 62.1 %).	Apprentices are employees of the company and paid in accordance with collective labour agreement based on age.	Apprentices are employees of the company, salary starts (in the 3rd yr.) with 30 % of a skilled worker and rises until 80 %.	Training contract; 3-yr. programme: in average 50 % of a skilled worker; 4-yr. programme: In average 46 % of a skilled worker.
Quote: Individuals who receive an apprenticeship contract after searching	Not available	60–70 %	Not available	64,9 %	87,6 %

Governance of the Dual VET System

Austria

Austria is a federal republic with nine states (*Bundesländer*). The Austrian Federal Ministry for Education and Women's Affairs (new BMBF, formerly BMUKK) is responsible for primary, secondary and tertiary education (including VET-schools). Tasks include funding, curriculum development; continuing and further training of teachers; school development and research on education, training and qualifications. The basic legislation is constituted in the School Organisation Act (SchOG) and School Instruction Act (SchUG). The curricula of the various school types are published by the BMBF as ordinances. At state level, certain authorities administer school education. Regional education boards are responsible for school inspection at provincial level at the upper secondary level (including VET schools).

For the enterprise-based training at federal level, the Federal Ministry of Science, Research and Economy (new BMWFW, formerly BMWFJ) bears responsibility (e.g. company-based training of apprentices and accreditation of professional qualifications) or other line Ministries (e.g. Federal Ministry of Health for schools for healthcare and nursing). The legal bases are laid down in the Vocational Training Act (BAG – *Berufsausbildungsgesetz*). For each individual apprenticeship occupation, the BMWFW issues a training regulation, which is binding for the training provided in training companies. The Federal Advisory Board on Apprenticeship (BBAB) is the representative body of the social partners (including VET-school teachers as advisory members) and submits expert opinions to the Ministry. At regional level, Apprenticeship Offices (economic chambers) are the responsible authorities for controlling and supervising the training companies.

The Austrian system of economic and social partnership is based on voluntary cooperation between statutory and voluntary interest groups and with government representatives. Statutory interest groups are representatives of the employers (Federal Economic Chamber), employees (Federal Chamber of Labour) and of agriculture (Standing Conference of the Presidents of the Agricultural Chambers). Voluntary interest groups include the Federation of Austrian Industry and the Austrian Trade Union Federation. Economic Chambers act as intermediate bodies and have specific responsibilities in the VET sector regarding controlling, examination and counselling such as accreditation of training company, organisation of the exam, award of qualification, providing consultancy for companies, financial incentives, publishing practical training guidelines. The occupational profiles and curricula of the different training regulations are negotiated between the social partners in the Federal Advisory Board.

Enterprises must be entitled pursuant to the Trade, Commerce and Industry Regulation Act to carry out training activities. Requirements are related to the scope of skills and knowledge of the relevant training occupations, equipment and personnel. A sufficient number of professionally and pedagogically qualified trainers must be available in the company. Those companies that cannot fully impart the

knowledge and skills of the training occupation have the possibility to train apprentices within the framework of a training alliance. Therefore, the company size is not limiting the apprenticeship training (ibw, 2014).

Germany

Statutory regulation documents establish the goals, content and timetable structures for Vocational Education and Training at the two learning locations. Companies are governed by training regulations and the vocational schools are regulated by framework curricula. There is no regulation that incorporates both spheres (e.g. an integrated training and education plan) or that is equally valid for both learning locations; this is likely due to the fact that Germany's federal structure and jurisdiction are shared between the federal and state governments.

The federal government is responsible for training regulations (usually the Federal Ministry for Economics and Energy) based on the German Vocational Training Act of 1969 (amended in 2005; covering among others the following apprenticeship trainings: Industrial clerk, Information Technology Specialist) or based on the Crafts Code of 1953 (amended in 2004; covering among others the following apprenticeship trainings: Electronics Technician, Carpenter). In accordance with Section 5 of the German Vocational Training Act or the Section 26 (BMBF, 2005) of the Crafts Code, the following five points must be established in a training regulation: name of vocation and recognised apprenticeship training, length of Vocational Education and Training (as a general rule, no longer than three years and no shorter than two years), vocational profile/training objectives (vocational skills, knowledge and abilities), structure of the apprenticeship/training framework (plan that includes content and timetable for passing on vocational skills, knowledge and abilities), examination requirements.

The vocational schools' curricula are made for the 16 states (Länder) by the 16 states' Ministries of Education. This means: There are currently approx. 330 recognised apprenticeship trainings with approx. 330 federal training regulations (first pillar) leading to 330 vocations. Due to the states' jurisdiction over their own education policies, each state could therefore theoretically issue its own curriculum (second pillar) for the school-based Vocational Education ($330 \times 16 = 5280$). This approach consumed in the past an enormous amount of time for each state (Land) and led to different school-based Vocational Education in the various states. For this reason the following system has been established: new and further development of curricula for Vocational Education in schools are coordinated by the Standing Conference of the Ministers of Education and Cultural Affairs (KMK), a voluntary coordinating body for the 16 state ministries without constitutional status (first congress in 1948). The developed curricula, so called KMK framework curricula, are subsequently adopted by each of the state ministries (usually without applying any further changes). The new and further development of training regulations for vocational training in companies is carried out by the Federal Institute of Vocational Training (BIBB; founded in 1970) on behalf of the Federal Ministry.

Although there is no single regulation for the two learning locations, in 1972 there has been a formal agreement between the Federal Government and the KMK (or state governments). This agreement specifies that the new and further development of training regulations and the new and further development of a KMK framework curricula are coordinated alongside one another and together with the relevant experts responsible for the regulations' new and further development. The experts from the Federal Institute of Vocational Training (BIBB) are generally representatives of employers' and employees' associations. That means that the training regulations for companies are developed by industry or craft representatives. The KMK's experts are generally teachers from vocational schools.

The formal-administrative agreement of 1972 constituted an important step in overcoming the formal duality of jurisdictions. The agreement was a necessary step for integrating the separate jurisdictions into one combined system and for it even to be called a dual system. It was a necessary step but it was not wholly sufficient (Gessler, 2016).

This operative role was granted to the chambers at the end of the 19th century. Thus, they control the companies and are responsible for the administration of final exams. Germany's dual system is therefore a company-based vocational training system with an additional compulsory Vocational Education component. This component consists of part-time schools, which are supervised by state authorities (Gessler & Howe, 2013).

Switzerland

In 2004, an updated Vocational Training Act brought major changes to Switzerland's educational sector. Following these changes, general education and Vocational Education became separate systems, as in Germany. Responsibilities were divided between different institutions and levels (national and local), again as in Germany. Since 2004, the two systems have been differentiated into the academic system and the non-academic system (general education, Vocational Education and education above and beyond company training). According to the new regulations, the central government has the responsibility to regulate all non-academic education that follows lower secondary education; this means that they control the education that occurs after the conclusion of compulsory education programmes. Changes to the state constitution, which occurred in 1999, were necessary to make possible this unified responsibility.

The new law declares that the central level, the regional level and the organisations of work (particularly the social partners and the associations of occupations) must cooperate with one another. Vocational Education is now integrated into the overall educational system but is simultaneously oriented towards company needs. Employability, work skills and the personal development of youth are equal goals. The combination of theoretical and practical learning has been integrated into school-based education and final certificates have been unified.

The two year programme, which concludes with the federal vocational certificate, was especially created for people with learning difficulties and disadvantaged persons. After completion of this programme, students may continue in a three- or four-year programme; thus, it is not a dead end. The federal certificate can also be earned without formal education—while competencies must be validated, a special examination is not necessarily required. Competence of prior learning is therefore recognised without discrimination.

Responsibilities are clearly defined for the three involved stakeholders: the confederation, professional organisations and cantons (SERI, 2016, p. 8–9).The confederation is responsible for strategic management and development and is tasked with:

- "Quality assurance and further development of the Swiss VPET[1] system
- Comparability and transparency of courses throughout Switzerland
- Enactment of around 230 VET ordinances
- Recognition of training courses for teachers, trainers, instructors and examiners within the VET and professional education sectors as well as training courses for vocational, educational and career guidance counsellors
- Recognition of foreign qualifications
- Payment of one-fourth of public sector expenditures for the VPET system
- Promotion of innovation and support for specific activities in the public interest"
  (SERI, 2016, p. 8).

Professional organisations are responsible for training content and apprenticeships and are tasked with:

- "Establishing the training content of VET programmes
- Establishing national qualification procedures for VET programmes
- Creating apprenticeship positions
- Developing new training courses
- Organising branch courses
- Managing VPET funds" (SERI, 2016, p. 9).

Cantons are responsible for implementation and supervision and are tasked with:

- "Implementing the Federal Vocational and Professional Education and Training Act (VPETA)
- Supervising apprenticeships and vocational schools
- Providing vocational, educational and career guidance services
- Creating options that prepare young people for enrolment in VET programmes
- Issuing permits authorising host companies to take on apprentices and/or trainees
- Apprenticeship marketing
- Providing training to apprenticeship trainers in host companies" (SERI, 2016, p. 8).

1 VPET: Vocational and Professional Education and Training

On the confederation level, there also exists in Switzerland the Swiss Federal Institute for Vocational Education and Training (SFIVET). This institute mainly provides training to teachers, instructors and examiners and is involved in research and innovation programmes. This role is therefore not comparable to the Federal Institute for Vocational Education and Training in Germany (BIBB). The BIBB is amongst other responsible for organising the development of new occupational profiles and training regulations or revising it, together with the social partners. Another general task of the BIBB is to contribute to vocational training research by means of scientific research.

The financial rules were also altered, and Vocational Education is now treated as general education; this means that subventions are no longer paid. Rather, Vocational Education is now a part of the system as a whole, and finances are calculated on the basis of output (how many persons where educated) and innovations (which contributions are necessary to improve the system). Aside from regular company contributions to facilitate the financing of company training, another tool was invented: sectoral vocational training funds. This new practice requires that all companies operating within the same sector (rather than only those companies who offer apprenticeships) pay into the sectoral vocational training fund. Organisations of work can apply at the state level to establish such a fund. This programme, however, does not represent automatism. For example, 30 % of companies within a given sector must offer apprenticeships. If this level is reached, a sectoral training fund can be established (Greinert, 2013).

The key facts are summarised in the following table.

Tab. 4 VET-Government Systems

	Austria	Germany	Netherlands	Norway	Switzerland
Legislation	Vocational Training Act 1969, latest version 2015, federal education regulations (incl. vocational schools) School Organisation Act.	Vocational Training Act 1969, amended 2005; Crafts Code 1953, amended 2004; additional laws for special sectors (e.g. health and care); federal states' education regulations; regional states' education regulations.	Adult and Vocational Education Act (WEB)	2006 Knowledge Promotion Reform; Education Act 2014	Vocational Training Act 1930, amended 1963, amended 1980, amended 2002
Competent bodies on national level	Federal Ministry of Science, Research and Economy (or other (line ministries); Ministry of Education and Women's Affairs for VET schools.	Federal Institute for Vocational Training (BIBB) for companies on behalf of the Federal Ministry; Standing Conference of the Ministers of Education and Cultural Affairs & ministries of the 16 Länder for the schools.	Ministry of Education, Culture and Science.	Ministry of Education and Research, consulted by the National Council for VET, Directorate of Education and Training.	State Secretariate for Education, Research and Innovation (SBFI).
Competent bodies on regional level	Regional Economic Chambers; Apprenticeship Offices	79 chamber of industry and commerce, 53 chamber of crafts, 7 chamber of agriculture and other bodies (e.g. for health and care).	Cooperation Organisation for Vocational Education, Training and the Labour Market (SBB)	19 Counties, consulted by 9 VET programme councils.	26 cantonal VET offices, supported by the Swiss Federal Institute for Vocational Education and Training.
Industry representatives	Training regulation is negotiated between social partners in the Federal Advisory Board; administration and competent body: economic chambers act as intermediate bodies.	Industry representatives (social partners) develop under the monitoring of the BIBB new occupational profiles and training regulations; at local level employers are represented by the chambers.	Sectoral level by centres of expertise on VET and labour market (social partners & VET), national coordination by SBB.	Industry representatives are present in councils on the national and regional with an advisory function.	State, Cantons, Employers associations and organisations of work have to cooperate by law together on all levels (especially professional associations).
Financing	Cost of training financed by companies (subsidies available); vocational schools financed by public (federation and states).	Cost of training financed by companies (25.6 bn gross cost, 7.77 bn net cost); cost of vocational schools public (federal 0.65 bn, Länder 2,8 bn).	Wages for apprentices paid by companies; subsidies for companies to cover costs of offering learning places in dual tracks are available; MBO colleges funded by government.	The state finances school education and each training company (15,000 Euro per apprentice).	Cost of training financed by companies (5.8 bn gross cost, 0.5 bn net benefit); cost of vocational schools by public (State (0.74 bn, all Cantones 2.2 bn).

Conclusion

The comparison shows that Dual Systems can have different configurations:

- Legislation (integrated/separated): in some countries (e.g. Switzerland) one integrated vocational training act regulates the entire VET System. In others (e.g. Germany) many separated acts (e.g. vocational training act, education acts of the 16 Länder, Nursing Act) regulate the VET System.
- Governance (unified/divided): in some countries (e.g. Switzerland) the responsibility for the VET-system is unified at the national political level. In others (e.g. Germany) the responsibilities are divided: different entities have just partial responsibilities.
- Competent bodies (state/economy): All the countries control the system on the regional level but the competent bodies are different: the VET-System is in some countries (e.g. Switzerland) controlled by state institutions; in others (e.g. Austria, Germany) it is controlled from representatives of the economy (usually chambers).
- Representatives of the working world (social partners/professional associations): in some countries (e.g. Austria, Germany) social partners (employer associations and trade unions) are the central representatives of the working world; in others (e.g. Switzerland) the major representatives are professional associations (nevertheless employer associations and trade unions are usually involved, too).
- Subsidies (yes/no): in some countries (e.g. Austria) certain subsidies are available, whilst in other countries (e.g. Germany, Switzerland) no subsidies are paid to companies.
- Intermediate organisations (yes/no): in some countries (e.g. Austria, Germany) exist intermediate organisations (e.g. chambers) between the state and the economy; in others (e.g. Switzerland) this intermediate organisation does not exist.
- Vocational Education and Higher Education (permeability/barriers): in some countries (e.g. Austria, Switzerland) the apprentices can prepare themselves within or at the end of apprenticeship for an examination enabling access to Higher Education. The system is therefore permeable. In others (e.g. Gemany) a fulltime course following the apprenticeship is necessary to receive Higher Education access. The system therefore creates education barriers.
- Training costs (benefit/loss): it is assumed, that apprentices are also productive. This production contribution reduces the gross costs of the companies. In some countries (e.g. Switzerland) the profit is higher than the costs. The companies receive on average a net benefit from the system. In others (e.g. Germany) the profit is lower than the costs. The companies receive on average a net loss from the system. This causes the question what type of apprenticeship or dual training is economically efficient.

It can be concluded from these observations that two different types of Dual Systems are identified: (1) An unified and coordinated Dual System under state re-

sponsibility with shared competence between state and economy (e.g. Switzerland) and a (2) divided Dual System under state responsibility but mainly directed by the economy (e.g. Germany).

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Developing Lecturers at VET Institutions through Engagements with Industry: the South African Experience

Ken Duncan

Abstract

This paper provides an overview of a current initiative in South Africa aimed at developing the technical and pedagogical competence of lecturers at public VET institutions through regular exposure to industry.

The calibre of the trainers and instructors is widely recognised as an important determinant of quality in any Vocational Education and Training (VET) system[1]. High-quality instructors produce highly skilled graduates and, subsequently, productive workers. Three aspects of the instructor's competence profile are considered especially significant, namely:

- Technical knowledge and skills
- Pedagogical skills
- Current and relevant industry experience

The current corps of lecturers in South African technical and Vocational Education and Training (TVET) colleges is weak in all three respects.[2] For example, a 2009–10 survey of lecturers in two provinces, Gauteng and KwaZulu-Natal, found that only 43 % had both a technical qualification and industry experience, 26 % had neither a technical qualification nor any industry experience and 29 % had no teaching qualification or experience. The researchers linked the lecturers' experience of practising their trades in the workplace to the quality of their instruction and their ability to prepare their students adequately for the world of work.[3] Given the low levels of technical qualification and industry experience, it is clear that a

1 Morrow (2007), Rauner (2012) and Wedekind (2016)
2 OECD (2014), Gewer (2013), NBI (2011), Bantwini & McBride (2011) and McBride *et al* (2009)
3 Wedekind & Watson (2016; p76)

massive, sustained effort will have to be made to upgrade lecturers in South Africa's TVET colleges. This may also be true for Namibian technical colleges, which prior to 1990 were modelled on their South African equivalents.

Internationally, evidence suggests that providing workplace exposure for teaching staff at VET institutions helps to bring the classroom curriculum into closer alignment with the skills needs of industry, motivates the lecturers to 'raise their game' and generally promotes long-term cooperation between college and company[4]. For this reason, several SA government policy documents – including the *National Skills Development Strategy for 2011–2016*, the 2011 *National Skills Accord* and the 2014 *White Paper on Post-School Education and Training* – have recently emphasised the importance of workplace exposure for lecturers. The 2013 national *Framework on Professional Qualifications for TVET Lecturers* makes experience of workplaces in the industry for which the lecturer is training a requirement for professional qualifications.

Real workplace experience is essential to both students and college lecturers because there are important differences between the world of the training institution and the world of real work for which students are supposedly being prepared. Some of these differences are summarised in the following table:

World of Training	***World of Work***
A sheltered environment designed to facilitate learning	An exposed environment designed to maximise productivity
Tasks are graded to match the student's level of competence and presented in ascending order of difficulty	Tasks arise in random sequence and are assigned in order of their urgency or priority
Support to perform a task is usually available	Little or no support is available: every worker is expected to complete all assigned tasks independently
Performance is assessed by a trainer who is primarily looking for evidence of progress on the part of the trainee, within a broad range of norm-referenced standards	Performance is assessed by a supervisor whose duty is to ensure that all work is completed... • exactly to specification • on time • within the budget
There are few and limited consequences to under-performance; in most cases, the trainee is given another chance to perform the task.	There are many serious consequences to under-performance, including loss of earnings, hostility of colleagues, demotion and dismissal

Compared to the training institution, then, the workplace is a hostile place – a kind of 'red zone' – for which students must be adequately trained. College lecturers cannot do this if they have not themselves had recent experience of working under real-life conditions. On the other hand, lecturers who do spend time in industry draw a number of benefits, including:

- Acquisition of current industry knowledge, skills and experience through exposure to industry experts
- A better understanding of industry needs and of the strengths and weaknesses of the college curriculum in relation to these

4 Bukit (2012), Clayton (2012) and Schüller & Bergami (2008)

- An increased capacity to link the theory and practice specified in the curriculum to their application in industry and to provide relevant examples of this during teaching
- Increased networking opportunities and the development of useful contacts with industry

Recently, two factors – one a push, the other a pull – have served to promote both pre-service and in-service industry experience for TVET college lecturers:

I. In June 2013, the Department of Higher Education and Training (DHET) adopted a new set of professional qualifications specifically designed for TVET lecturers. Since each new qualification requires a specified amount of industry-based professional experience, new entrants into the lecturing corps and current lecturers who seek to improve their qualifications will all spend some time in industry as part of their studies.

II. Since then the DHET, as the employer of lecturers in public TVET colleges, has been in negotiations with lecturers' unions on the introduction of a points system for quantifying and recording continuous professional development – including time spent in industry – undertaken by lecturers. Thus, even if a lecturer is not studying towards a formal qualification, he can obtain recognition for industry experience that could count towards promotion, salary increases and other kinds of career advancement.

Against this background, in 2012 the Swiss-South African Cooperation Initiative (SSACI) initiated a pilot project aimed at improving the technical knowledge and skills of lecturers in public TVET colleges through short periods of work-integrated learning (WIL) in industry. SSACI is a non-profit, public-private partnership aimed at strengthening the national skills training system in South Africa. In pursuit of this objective, SSACI has a four-legged strategy of:

- Linking public TVET colleges to industry
- Initiating and implementing proof-of-concept projects in skills development
- Catalysing government initiatives and supporting their implementation
- Feeding lessons from these interventions into government policy and programmes

In 2012–13, SSACI worked with ten colleges to:

- Conceptualise industry-based WIL for TVET college lecturers and their supervisors (e.g. heads of academic departments and campus managers)
- Profile different categories of lecturers in terms of background, qualifications, skills and work experience, define what sort of industry experience would be beneficial to each category and decide how best it could be acquired
- Understand the college context, including lecturer employment issues, current staff development policy and practice, implementation issues, concerns and requirements

- Understand the situation in the industrial workplace in which lecturers will be placed, including employers' interests, expectations and concerns
- Integrate lessons learned from industry placements into the college curriculum

Once a model for industry-based WIL for lecturers had been developed for the systematic implementation by colleges, the project was extended in 2014–16 to another 18 public colleges with funding from the parastatal sector education and training authority for the education and training sector. In total, to date[5]:

- 28 public TVET colleges have been assisted to develop and implement standard policies and procedures for implementing industry-based WIL
- An instructional manual, guidebooks for colleges and companies, and templates for related documents have been developed
- Over 650 lecturers have undertaken industry placements

During the second phase of the project from 2014 to 2016, additional attention has been paid to:

- Investigating how lecturer placements in industry can be implemented within the new professional qualifications being developed for lecturers by universities
- Building capacity in the public skills development system by, for example, advising ETDP SETA staff on how to support colleges on the implementation of LWE implementation

In conceptualising and designing industry-based Wil for lecturers, SSACI was guided by the following principles:

- The lecturers' time in industry must result in clear benefits to all participants, namely the lecturer, the college and the industry employer
- Lecturers should take responsibility for planning and organising industry engagements as part of their own professional development
- The nature and length of the lecturers' industry engagements should fit their purpose
- Time spent in industry must not disrupt teaching
- Lessons from industry engagements must be integrated back into the curriculum

These principles led naturally to the adoption of a standard, four-phase implementation cycle, as follows:

i. **Planning**, which includes the development of a college policy on industry placements for lecturers, a budget, specific plans for recruiting host employers, assigning and replacing lecturers, and recording and reporting experience.
ii. **Preparation**, which includes helping lecturers to draw up individual programmes, matching lecturers to suitable workplaces, briefing host-employers and making the necessary logistic and administrative arrangements.

5 Smith (2016; p. 9 & p. 30–32)

iii. **Engagement**, i.e. spending time in industry to meet with practitioners of the occupations for which the lecturer is training college learners, study equipment, systems and procedures, and perform pre-arranged work assignments; an engagement may range in length from a week to several months but, in all cases, a record must be kept in the form of a logbook or journal of what was done, when and to what end.

iv. **Post-engagement reflection**, through which the lecturer writes up his experience in the form of reports to college and company management, thinks about what he/she has learned from that experience, develops a plan for integrating the learnings into classroom teaching and the college curriculum, and generates some ideas for future, follow-up engagements.

Experience gained through the implementation of the project in 28 colleges to date suggests that:

- Exposure to the industrial workplace develops, motivates and energises lecturers: they learn a lot about current technology, industrial systems and processes, feel empowered by that experience and usually want to experience more.
- This learning often supplements and enhances what the lecturers know already rather than leads them into entirely new learning areas.
- While the lecturers' knowledge and understanding of their target industries is usually improved by their time in the workplace, they are seldom there long enough or perform sufficiently demanding work there to develop their own technical skills; this aspect of their competence therefore remains both a problem and a priority for many lecturers.
- Industry exposure by even a few lecturers in a college has a noticeable 'ripple effect' on the wider department or faculty. Participants talk informally to their colleagues about the benefits they have received from their experience and this motivates colleagues to try it as well. Spending even a little time in industry becomes a matter of professional pride and status.
- Putting lecturers into industry fosters broader and deeper relationships between college and company.

Lecturers integrate experience from the workplace into their teaching through a range of strategies and processes, including:

- Revising lesson plans to incorporate real-life examples and case studies
- Supplementing core curriculum with content not prescribed but relevant to industry
- Simulating the workplace in the college, e.g. in the layout of workshops and in the organisation of complex, multi-stage tasks that require sequenced inputs like those on a production line
- Assigning students activities similar to those in industry
- Assessing performance by industry standards
- In-sourcing real work for students
- Sharing information and experience with colleagues

No single lecturer uses all these methods, nor can all of them be found in a single participating college. However, in all colleges in the project, combinations of at least some of these methods can be found, indicating that integration of lessons from industry experience into classroom teaching is happening at the level of the individual lecturer, though not yet systematically or institutionally.[6]

Experience to date also shows that:

- Tailoring lecturers' engagements with industry to their training needs is complicated. The interests and needs of lecturers differ widely, especially between those teaching fundamental subjects like mathematics and language, those teaching general technical subjects like electricity and physics, and those teaching specific artisan trades. Thus, there can be no standard itineraries or programmes for industry engagements. Each one has to be individually planned and organised.
- The demands on college management are significant. They include:
  - Finding suitable workplaces for lecturers to spend time in (which is especially challenging in rural areas) and tasks for lecturers to perform while there
  - Setting priorities and devoting college resources in such a way as to be fair to different campuses, programmes, post-levels and personnel, yet at the same time use limited resources efficiently and effectively
  - Making logistical and administrative arrangements, including travel, accommodation if necessary, insurance, communications, recording and reporting, and the temporary replacement of staff on placement in industry
  - Managing the differences in organisational culture between colleges and companies; these are particularly pronounced when it comes to working hours, dealing with authority and etiquette in meetings

Finally, it needs to be acknowledged that there is no tradition in South African industry of hosting college lecturers for industry experience. To bring companies on board in the required numbers will take a great deal more lobbying and advocacy amongst businesspeople, trade unions and legislators. Above all, the *business* case for industry-placements of lecturers – that is, what's in it for the *company* – needs to be made much more strongly. That case includes:

- the opportunity a host-company has to influence teaching and learning programmes at the local college in such a way as to address the company's skills needs directly, thus ensuring a steady supply of appropriately skilled employees and, at the same time, reducing future costs of recruitment, induction and in-house training
- earning points on the company's Black Economic Empowerment scorecard, which is essential for companies supplying goods or services to government and useful to companies that in turn supply to them

6 Smith (2016; p32)

- capacity-building and job-enrichment for company employees assigned to act as coaches or mentors to visiting lecturers, which is an important contributor to staff morale and thereby to productivity and retention

Much work remains to be done to improve the quality and alignment with industry of the teaching in TVET colleges in South Africa. What has been accomplished so far through short-term placements of lecturers and other engagements with industry demonstrates that this is a strategy that deserves widespread adoption.

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Models of University-based Further Education Programmes (FEPs) for Vocational Education and Training (VET) Practitioners and the Economic Development of Sub-Sahara Africa

Benjamin A. Ogwo

Abstract

Globally, universities adopt locally/regionally-suited models in fulfilling their workforce development roles. However, the Sub-Saharan African (SSA) universities have not kept pace with developing a competent workforce for the informal, non-formal, and formal sectors of the economy by providing functional, and country-specific Further Education programmes (FEPs). For example, the informal sector continues to play significant economic roles in SSA countries without commensurate assistance towards developing its workforce; hence, it is incumbent on the universities to develop FEPs for upskilling the sector's workforce. Evidence abound of the SSA governments' neglect of the informal/non-formal workforce development enterprises due largely to their nebulous nature, and the high illiteracy rate among the practitioners. Fortunately, there are university-based workforce development models that could adapt learning objects, digital software applications, apprenticeship programmes, massive open online courses (MOOC), internships, and dual systems in developing FEPs for Vocational Education and Training (VET) practitioners. Thus, this paper explores four university-based FEPs models and the prospect of using them in upskilling VET practitioners in Sub-Saharan Africa. It discusses these different FEPs and the universities' roles in providing a competent workforce for economic development of SSA. The viable FEP models should be inclusive, provide employability skills/transferable credentials, recognize prior knowledge and lead to the sustainable economic development of the region. Their

successful implementation is pivoted on the mutual respect between the universities and VET practitioners since each party has valuable occupational content and community-derived socio-economic constructs required for the FEPs to precipitate the economic development of the SSA countries.

Background and Context

There is a direct relationship between the technological and human capital development levels of any nation. This relationship is made more apparent by the quality of the workforce versus the type of technology/industry prevalent in the economy. In the workforce composition of any nation, the professionals/highly skilled are at the apex, at the middle is intermediate-level skilled (such as Vocational Education and Training [VET] practitioners) while at the base are untrained/low skilled workers. In most of the developed countries, the VET professionals outnumber the low skilled workers within the working population while in Sub-Saharan African (SSA) countries the workforce is disproportionately populated by unskilled/low skilled workers, mainly the youths (Adams, Johansson de Silva, and Razmara, 2013).

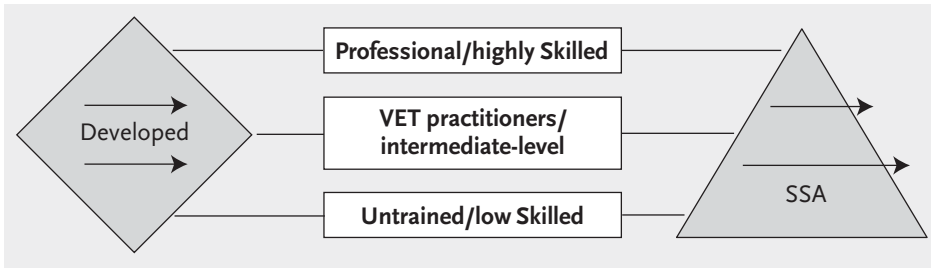

Fig. 1 Workforce Composition in Developed and SSA countries

The SSA countries have continued to experience a mismatch between its workforce needs and types of skills available to match the increasing complexity of their economy. Many of the semi-skilled/low skilled workers in SSA are found in the informal sector which accommodates a large segment of the economy. Hence, any workforce development model that discountenances this reality is unlikely to succeed. Apparently, integrating economic development initiatives with VET practitioners' upskilling programmes in both the formal and informal economic sectors of SSA will facilitate the achievement of the region's sustainable development goals (SDGs). Such inclusive approach towards implementing the SDGs will effectively contribute towards ameliorating poverty, and ensuring that all citizens participate in the region's economic growth. Indeed, attaining the objectives of the workforce development components of the SDGs in SSA are fraught with structural and perceptual challenges namely:

- The informal sector of the economy that bears the bulk of the workforce and economic development in SSA has been seriously neglected over the years; resulting in untold consequences for the VET practitioners and the economy (International Labour Office [ILO], 2012).

- The ivory tower stance of the universities alienates them from the community and has hampered the extension/cooperative/community services required of them.
- Insufficient policy direction on Further Education for VET practitioners in informal and non-formal VET sectors for institutions desiring to facilitate such programmes.
- The non-formal/in-plant training VET system is not properly articulated in many Sub-Saharan African countries.

These structural and perceptual challenges can be tackled by implementing the four proposed FEP models within the university setting. If the objectives of the FEPs are attained, the outcomes will lead to divide bridging between the ivory tower and the informal and non-formal sectors thus providing the needed attention to the sectors as well as providing empirical data to formulate policies that would address workforce development issues in informal VET sub-sector.

However, for the SDGs to be attained, its initiatives for SSA countries has to specifically include university-based workforce development programmes on Further Education programmes (FEPs) that include the informal and formal economic sectors. It is antithetical for the international development agencies and governments of SSA countries to increasingly pursue policies that tend to provide more low-skilled jobs rather than upgrading the skills of the workforce in both sectors of the economy. The SSA countries can never be globally competitive if their workforce is predominantly low-skilled workers in low tech occupations. The workforce development agencies and employers' associations, trade unions should work with the industry to identify their needs and assist in conveying those needs to the universities for developing effective FEPs that will ensure a better-prepared workforce. There are university-based models (Apprenticeship, dual system, modularized and the Viaduct model) of FEPs which can be adopted in up-skilling the VET practitioners in the formal and informal sectors as well as ensuring the economic development (increased productivity, investment [return on investment of trainees and increased foreign investment], increased GDP, poverty reduction and pursuit of happiness) of Sub-Saharan Africa. Thus, this paper explores four university-based FEP models and the prospect of using them in upskilling VET practitioners in Sub-Saharan Africa. It discusses the different FEP models and roles of the universities in providing a competent workforce for economic development of SSA.

Models of University-based FEPs for Sub-Sahara Africa

Further Education or continuing/professional education (term used in the United States of America) programmes are post-secondary and non-degree courses offered by the university for workforce development and cooperative/community service. In most United States' public universities, FEPs are usually provided by the research/academic departments/units as community engagement activity linking university research outcome/available faculty expertise with real-world prac-

titioners from different industries (The American Academy of Arts & Sciences, 2015). However, in SSA countries, most of the FEPs are limited to post-secondary and the educated people; at the neglect of some VET practitioners who may be illiterate. Universities in SSA are challenged to evolve FEPs that are inclusive of the formal and informal sector workforce. FEPs will provide the needed intervention on improving the knowledge base and upgrade the quality of technical skills proficiency available to the informal sector. There are numerous areas of VET in which the FEPs could be developed but each country should determine the trades/occupations of urgent need such as the automobile, agriculture, technical services (electronic and mechanical technology maintenance), construction, food services, computer technology etc. In order to align the FEPs with the SDGs, the following are the general objectives for the SSA models:

1. Making the employees and local companies nationally/internationally more competitive.
2. Providing a seamless link between the skills/experiences acquired in both the formal and informal sectors of the economy.
3. Encouraging more direct investment and making Africa the next outsourcing destination by upskilling the workforce.
4. Improving the quality of life of the citizens irrespective of their level of education by improving on their skills irrespective of how they were acquired – formally/informally.
5. Increasing the returns of investment of the trainees – demand-driven programmes; thereby reducing the unemployment/underemployment rate by providing competency-based programmes.
6. Employing the expertise, organization and structure of the universities to solve workforce challenges of the countries.

In order to attain these FEPs objectives, the four proposed models are Formal Apprenticeship, Dual System, Modularized, and Viaduct. Table 1 outlines the major characteristics of these models. The curriculum contents of these models need to be competency-based, flexible, demand-driven and industry-specific. Of particular importance is the viaduct module in which VET practitioners are offered bridge/preparatory contents on basic education (English, mathematics, e-literacy, enterprise management). The viaduct model is the bridge between the informal sector VET practitioners and the formal education system. Its graduates should be able to transfer obtained credentials to other formal education programmes and the FEPs. All credentials obtained from the FEPs must be transferable and constitute foundational courses for degree programmes. The four FEP models are complementary to one another and student centred as well as need driven. The VET institution and the student should work together in choosing the most suited FEP for each student based on interest, background (prior learning) and skill set. For example, the modularized model could be taken by anybody even those already enrolled in the formal apprenticeship or the dual system, especially if the knowledge and skill set in a particular module will provide immediate return on invest-

ment (enhancing the student's economic circumstance) and at the same time complement the student's progress in any other model. The SSA universities should step up towards assessing and recognizing prior learning, researching on VET/FEPs, writing policy briefs, developing instructional materials (use of apps (translating to indigenous language) and digital technology) and adopting contextualized learning/instructional strategies. The effectiveness of these FEPs is proportional to the extent of contextualization of their implementation processes specifically, integrating the curriculum content with industry standards, locating each FEP within career pathways of the student, specifying the entrepreneurial application of skills taught.

Tab. 1 Types and Major Characteristics of the Further Education Programmes

Sn	Major Characteristics of the Model	Models of FEP			
		Formal Apprenticeship	**Dual System**	**Modularized**	**Viaduct**
1.	**Objectives/roles of the university**	Develop content/ oversee recognized apprenticeships for specific trades to be implemented by approved industries/ dept. of labour or trade associations/ unions	Combine skills training in a company and theoretical content delivery at the university.	Develop standardized contents/modules on industry-validated skills set in different occupational areas	Develop general education programmes on basic communication, science, and numeracy linked with the trades.
2.	**Target Population/Qualification**	Post-secondary/ primary and out-of-school youths	Post-secondary/ primary and out-of-school youths	No educational/sector restriction, underemployed people	Informal sector illiterates
3.	**Industry and occupational Area**	Technical service trades, hospitality, and tourism	Technical occupations	All occupations	Non-restrictive
4.	**Mode of Delivery**	Use of MOOC, work-based learning (Cedefop, 2015)	Work-based learning, MOOC, face-to-face	MOOC, eclectic, face-to-face, hands-on	Face-to-face,
5.	**Structural Linkage with university**	Domiciled in a company	Domiciled in the university	Domiciled in the university	Domiciled in the university
6.	**Duration**	Minimum of two years	Minimum of two years	Minimum of four weeks	Minimum of one year
7.	**Certification**	Trade license	University diploma	Certificate per module/non-certification	Certificate

Implementation Issues for the University-based FEPs

In all of the SSA countries, there is a preponderance of FEPs and capacity building/non-formal/in-plant programmes designed and supported by governments and international development partners (UNDP (United Nations Development Programme), UNESCO (The United Nations Educational, Scientific and Cultural Organization), AfDB (African Development Bank), World Bank, GTZ (Gesellschaft für Technische Zusammenarbeit), DFID (The Department for International Development), USAID (The United States Agency for International Development) etc.). Furthermore, the proposed university-based models of the FEPs are similar to those already run by cooperative units of most universities. However, the striking

difference between the cooperative units' FEPs and the proposed FEPs is that they should be implemented within a full-fledged VET academic department, its design/implementation decisions are based on qualitative/quantitative data obtained from needs assessment, properly accredited by an external agency and providing for VET practitioners' input at the various levels of implementation and governance. It is extremely important to involve the target populations in every design and implementation process of the FEPs to ensure ownership and commitment towards the attainment of the objectives. For example, the leadership of the informal sector trade unions has been working with national/international development agencies on short-term intervention programmes; hence such organized practices will be the leverage for the university-based FEPs to latch on. All the major stakeholders (captains of industry, trade union/association, employers and university administrators and students) should have specified roles in all the governance, decision-making structure and committees. In addition, the policy on implementing the university-based FEPs should incorporate some incentives for VET institutions that reached out to the informal sector. These VET institutions could offer scholarships for the informal sector VET practitioners that enrol in the FEPs and government/international development partners will bankroll the funding of the FEPs. This will be a win-win situation for the institutions, the informal sector, and the national economy.

The FEPs should be service-driven hence the university should not regard them as soft targets for internally generated revenue. When an effective governance structure is agreed upon by all stakeholders, the FEPs would attain remarkable credibility that can easily translate to funds from government agencies, companies, employers and international development agencies. Especially for the Viaduct model and modularized FEPs, there should be scholarships for the students while the dual system and formal apprenticeships could pay stipends to the trainees. In terms of instructional delivery, there are already developed learning objects and lots of massive open online courses (MOOCs) that are free and adaptable to the contents of the FEPs. Table 2 shows the list of some web-based resources and MOOCs that could be used for content delivery. In order to reduce the implementation cost, there should be a generous utilization of digital materials, interuniversity cooperation and articulation agreements within/outside each SSA country. Of equal importance is the need for interregional and regional academic and development collaborations (AU [African Union], ECOWAS [Economic Community of West African States], SADC [Southern African Development Community], BRICS [Brazil, Russia, India, China and South Africa]) – providing critical mass of students versus resources, focus on south-south cooperation in respect of human/material exchanges (United Nations, 2010), establishment of a regional material and content development centres. Other national/regional level implementation measures include:

- Prioritizing for occupations of utmost need – demand-driven
- Harmonizing international certifications and involvement of examination bodies

- Provision of assistance from international companies and donor agencies
- Development of digitalized content/media

Tab. 2 List of Web-based Resources and Massive Open Online Courses (MOOC) and their Websites

Sn	Title of the Resources and MOOC	Description	Website
1.	**Course Buffet**	Hundreds of free online MOOCs courses from over 250 Universities e.g. computer & technology, engineering, Health & nutrition, education etc.	https://www.coursebuffet.com/
2.	**The VOCEDplus Pod Network**	Allows instant access to research outcomes and other resources on vocational courses.	http://www.voced.edu.au/pod-network
3.	**OpenEducationEuropa (The gateway to European innovative learning)**	The Open Education Europa MOOCs Scoreboard includes more than 1,500 open courses throughout the European Union.	http://www.openeducationeuropa.eu/
4.	**Canvas Network**	Online courses (business, education, interdisciplinary etc.) from colleges, universities and organizations worldwide.	https://www.canvas.net/
5.	**Websites, Apps and more**	Apps, the internet sites, and resources for education, training, and professional development.	https://www.okcareertech.org/educators/cimc/resources/downloads-1/
6.	**edX**	And open-source platform of 90 global partners comprising Massachusetts Institute of Technology (MIT), Harvard University etc. that offer 910^{+} courses on computer science, engineering, mathematics, communication, education etc.	https://www.edx.org/
7.	**Commonwealth of Learning**	An inter-governmental organization that develops resources and programme (VET, teacher education, lifelong learning for farmers etc.) for the 54 member states of the commonwealth of nations.	http://www.col.org/what-we-do
8.	**Khan Academy**	Offer free courses in mathematics, science, computing, arts and humanities, entrepreneurship etc.	https://www.khanacademy.org/
9.	**MITOPENCOURSEWARE (Massachusetts Institute of Technology)**	Web-based of MIT course content in engineering, science, mathematics, education etc.	http://ocw.mit.edu/courses/
10.	**Coursera**	Offering 1867 courses designed across 28 countries on physical science, engineering, computer science etc.	https://www.coursera.org/browse?languages=en
11.	**Knowledge Lover**	Names/website addresses of 70 + Best MOOC (Massive Open Online Course) Providers List.	http://knowledgelover.com/best-mooc-massive-open-online-course-providers-list/3/
12.	**WSIS Knowledge Communities**	Global List of Open Educational Resources (OER)	http://www.wsis-community.org/pg/directory/view/672996

The Economic Development of Sub-Saharan Africa and the FEPs

The FEPs would accelerate economic development resulting in skilled/globally competitive workforce, increased GDP, poverty reduction, a decrease in youth unemployment and creating outsourcing destinations in SSA countries. The informal sector which has not fizzled out even with the lavished attention on the formal sector (Ogwo, 2013) should be restructured/upskilled to contribute more to the

economy. It would be foolhardy to expect scholars from other regions to fulfil this responsibility. The ivory tower stance of SSA universities should be jettisoned in order to enable the faculty to associate with their community's economic aspirations. The FEPs remain the veritable models for developing competency-based content and demand-driven programmes for supplying the skilled workforce required to attain the SDGs. Universities within the Asian tiger economies provide examples for African universities in transforming their workforce and becoming more globally competitive. There is every need for home-grown FEPs rather than foreign models. It is pathetic to note that most countries in SSA attained political independence over five decades ago but have not shown committed efforts towards economic independence. In this regards, the FEPs, even as a stop gap would provide the much needed functional and experiential education that targets economic development and independence.

Conclusion

There are no silver bullets in the FEPs models rather they provide the guidelines towards tackling the workforce development challenges facing the SSA and do provide the exemplary models for demand-driven, competency-based, and accountable education in SSA. It will require the commitment of all major stakeholders and political will of SSA governments to implement and upskill the informal/non-formal sector workforce. The SSA economies would not achieve sustainable advancement if it continues to neglect the informal/non-formal sector or to continually graduate unemployable Higher Education students. If the governance structure of the FEPs is deemed effective by all the major stakeholder, the universities deemed to be committed to achieving the objectives, funding would not be of import because the national, regional governments and international development agencies would certainly adopt them in tackling youth unemployment and pursuing most of the sustainable development goals in SSA.

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Applied Learning design in an online VET teacher-education course: A pedagogical framework that responds to the needs of mature-aged, employed students

Jillian Downing

Abstract

As one of the major contributors to the education sector in Australia, Vocational Education and Training (VET) operates within a number of contexts, including schools, private training providers and Technical and Further Education (TAFE) colleges. It takes responsibility for the continuing education of nearly two million students (from high school age to mature age) each year. Within VET there are approximately eighty thousand teachers employed, mostly on a part-time basis, delivering a wide range of courses (e.g., construction, hospitality, aged care, business, retail, tourism, arts, child-care) and catering for both employed students (e.g., apprentices) and pre-employment students. Unlike many other countries, teachers employed within the VET sector in Australia are not required to hold a degree in teaching, although a growing number are interested in pursuing a university degree in order to progress their career and professionalism.

This paper considers four aspects of VET teacher-education in Australia. Firstly, it provides an overview of the qualifications and experience required by providers of VET and identifies the opportunities universities have to offer additional professional development. As VET teachers are likely to be mature-aged, juggling work with study and been away from formal study for some time, there is a need for providers to consider how best to respond to these students. Secondly, this paper describes the approach taken by the University of Tasmania in a relatively new VET teacher-education programme, a *Bachelor of Education (Applied Learning)*. The specialty focus of the course, 'applied learning', represents the desired pedagogical approach in VET settings — bringing application and theory together in an inte-

grated fashion in order to facilitate effective learning. An innovative approach was adopted to the design and development of units within the course, in order to create a learning environment that 'walked the talk' of applied learning whilst still reflecting the academic rigor expected in a university degree course. A set of six theoretically underpinned 'applied learning' design principles were articulated, which guided teaching staff as the course was developed, incorporating aspects such as student collaboration, integrating learning tasks with workplace roles, and ensuring that assessment tasks were authentic and applied.

The third part of this paper considers a recently completed doctoral study on the effectiveness of the design principles guiding the course. The findings led to a greater understanding of the nature, characteristics and needs of the students, including a vulnerability for self-doubt and withdrawal but also a desire to contribute altruistically and positively to the learning community. The investigation concluded that an applied learning approach that respects and integrates the students' lived experience can lead to positive, even transformational outcomes for students. The study also identified ways for course designers to capitalise on the affordances of web-based technology to support geographically and characteristically diverse students.

Finally, this paper considers the future of VET teacher-education in Australia and more broadly, considering the growing demand for high quality VET education and the subsequent role for universities. Most importantly, the paper contends that providers must consider how best to ensure a relevant, engaging and rewarding Higher Education experience for a diverse and dedicated VET workforce, who are developing the next generation of workers in a wide-range of industries and professions.

Keywords

Applied Learning, authentic learning, VET teacher-education, Higher Education pedagogy, online learning, design principles.

Introduction and background

The Vocational Education and Training (VET) sector fulfils a critically important role in Australia in preparing adolescent and mature-aged students for their chosen vocation or career. Teachers employed within the VET sector in Australia are likely to have had a successful career within their specialist area before moving into a teaching role. For example, they have been carpenters, electricians, chefs, hairdressers or mechanics and, typically, become teachers through a desire to give back to their industry (Productivity Commission, 2011). As VET teachers, their job role extends beyond teaching to working closely with employers and industry partners to support the apprentices and employees in their chosen careers.

Since the 1990s, Australia has adopted a national approach to VET, with a suite of training packages that are delivered by teachers in Registered Training Organis-

ations (RTOs). A training package is a set of nationally endorsed standards and qualifications for a specific industry, (e.g., construction or hospitality). Each training package is developed by the related national Industry Skills Councils (ISCs) and should represent the desired skills and knowledge required by employees in that sector. Qualifications within each training package usually start with a foundational Certificate I and progress to a more advanced level, such as a Diploma. Every RTO that delivers training packages must conform with national requirements relating to the quality of delivery and assessment of the qualifications, or risk losing the right to offer their chosen training package.

Unlike many other countries, teachers employed in the VET sector in Australia are not required to hold a degree in teaching. Rather, the minimum requirement to teach or assess students enrolled in any of the VET qualifications is a Certificate IV in Training and Assessment (Cert IV TAE), which is a relatively short course to complete. Additionally, all VET teachers should have relevant industry experience and hold the vocational qualifications (such as Diplomas) in their subject area, at one level above the level that they are teaching. While some VET teachers may have university degrees in their discipline area (e.g., engineering or business), about 60 % of VET teachers do not (Productivity Commission, 2011). Hence, the typical educational profile of a VET teacher is quite different to a teacher in the school sector, who has completed a four year degree in teaching, or a degree in their discipline area (e.g., science) followed by a post-graduate degree in teaching.

While holding a university degree in teaching is not mandatory, many VET teachers are interested in pursuing a higher-education qualification in order to improve their knowledge and skills and advance their career. The VET teachers who decide to undertake university teacher-education courses are, however, likely to be quite different to the traditional university student. Many VET teachers, particularly those from trades with a traditional apprenticeship pathway, such as construction, hairdressing, and the retail sector, left school at a relatively early age and not consider themselves to be 'academic'. Many will be first-in-family to attend university and, as mature-aged entrants, have been away from formal study for a considerable time. They are also likely to be adding university study to other roles such as employee or parent. With these characteristics, VET teachers undertaking university study are very likely to fit the description of 'non-traditional' students (Munro, 2011) and as such, are representative of a growing segment of the university student cohort (Allen & Seaman, 2014). For these students, engaging in Higher Education is a daunting prospect and a supportive, constructive and positive learning and teaching environment is needed in order to attract and retain enrolment (Gilardi & Guglielmetti, 2011). Yet despite increasing numbers of non-traditional students, there is little evidence that universities are actively responding to their needs (Meuleman, Garrett, Wrench & King, 2014). This may be a contributing factor to the current situation in Australia where there is a struggle to maintain healthy student numbers in VET teacher-education programmes, and a consequential reduction in the number of courses on offer.

Applied Learning in VET teacher education

In 2012, the University of Tasmania began a new VET teacher-education course, a *Bachelor of Education (Applied Learning)*. Historically, applied learning is most commonly referred to as 'learning with your hands' and pedagogically is most closely aligned with experiential learning (Dewey, 1938; Kolb, 1984). It melds together the two kinds of knowledge that philosopher Gilbert Ryle (1949) suggested: *knowing that* and *knowing how.* Ryle (1949) proposed that integrating theoretical knowledge (*knowing that*) with practice (*knowing how*) enables a student to move beyond being trained and into a space where the skills of lifelong learning are internalised. Thus, an applied learning approach has the potential to bring together theory and practice in a manner that builds the type of attributes sought in university graduates. Although usually associated with the VET sector, the Higher Education literature reveals a limited but growing interest in applied learning through "the kind of pedagogical principles and practices associated with engaged scholarship, communities of practice, civil engagement, and critical pedagogy" (Schwartzman & Bouas Henry, 2009, p. 5). Ash and Clayton (2009) suggest that an applied learning approach in Higher Education is:

> *... grounded in the conviction that learning is maximized when it is active, engaged and collaborative. Each applied learning pedagogy provides students with opportunities to connect theory with practice, to learn in unfamiliar contexts, to interact with others unlike themselves and to practice using knowledge and skills (p. 25).*

Applied learning pedagogy focuses, therefore, on connecting theory with practice through context-based activity, and as such is broadly aligned with authentic learning (Herrington, Reeves & Oliver, 2010), situated and experiential learning (Brown, Collins & Duguid, 1989; Dewey, 1938; Kolb, 1984), the characteristics of adult education (Knowles et al., 2011; Mezirow, 1991) and communities of practice (Lave & Wenger, 1991).

Drawing upon this literature and more broadly, a set of applied learning design principles was created to guide the development and delivery of the four year, fully online, undergraduate degree at the University of Tasmania. Table 1, below, describes each design principle guiding the course, along with its theoretical underpinning and enactment into the course.

Tab. 1 The Applied Learning Design Principles, their theoretical underpinnings and enactment into the course.

Applied Learning Design Principles		
Design principle	***Theoretical underpinning***	***Students will be:***
1. Provide learning activities that connect theory and application in authentic contexts.	Experiential Learning Theory (Dewey, 1938) Authentic Learning (Herrington, Reeves, & Oliver, 2010) Situated learning (Brown, Collins, & Duguid, 1989) Realistic Teacher Education (Korthagen, 2001) Applied teacher-education (Darling-Hammond, 2006)	• Involved in activities that integrate theoretical concepts with practical application; • Encouraged to make connections between what they are studying and the real workplace issues and challenges; • Engaging with authentic problems and integrating those with their studies; and, • Working closely with practitioners to better understand the skills and knowledge required in the workplace.
2. Recognise the lived experience of students.	Adult learning theory (Lindeman, 1926; Knowles, et al., 2011) Transformational learning (Mezirow, 2000) Workplace learning (Billett, 2004) Reflective practice (Brookfield, 1995; Schön, 1983)	• Recognised as having relevant and valuable life experiences; • Encouraged to critically reflect on those experiences in the learning process; • Invited to consider alternative approaches and perspectives; and, • Engaged in deepening their understanding through new experiences in a range of settings.
3. Provide meaningful opportunities for the collaborative construction of knowledge within the learning community	Authentic Learning (Herrington et al., 2010) Communities of Practice (Lave & Wenger, 1991) Learning communities (Salmon, 2011; Shulman, 2004) Community of Inquiry framework (Garrison, Anderson & Archer, 2001)	• Encouraged to take on roles that enable them to contribute meaningfully to the online community; • Invited to contribute altruistically to the learning environment for the benefit of their peers; and • Supported as they undertake collaborative activities, in recognition of the challenges that lie within it, particularly in the online environment.
4. Encourage the development of a professional identity through collegial interactions in a range of settings.	Identity and practice (Wenger, 1999) Reflective practice (Brookfield, 1995; Schön, 1983) Communities of Practice (Lave & Wenger, 1991) Dialogue of Inquiry (Kozminsky, 2011; Loughran, 2006)	• Encouraged to be actively involved as a member of their professional community; • Building evidence of their attainment of the professional standards of teacher-education graduates; • Engaged in robust discussions and interactions with their peers and teaching staff on a wide range of topics relevant to their profession; and, • Actively building their professional identity.
5. Provide authentic assessment tasks that reflect the way the knowledge will be used in real work settings.	Authentic assessment (Herrington & Herrington, 2006) Sustainable assessment (Boud, 2006) Formative feedback (Black & Wiliam, 1998; Hattie, 1999) Authentic assessment in teacher-education (Darling-Hammond, 2000; Shulman, 2004)	• Completing assessment tasks that require the skills and knowledge associated with their future roles in the workplace; • Creating practical products that will be meaningful and useful to learners in their profession; • Participating in peer-review and formative feedback processes; and, • Engaging in a number of activities in any one assessment task.
6. Encourage an increasing level of student ownership of learning.	Student autonomy in learning (Boud, 1988) Identity and ownership (Chickering & Reisser (1993) Ownership of Learning (Dudley-Marling & Seale, 1995) Adult learning theory (Knowles et al., 2011) Reflective practice (Brookfield, 1995) Authentic learning (Herrington et al., 2010)	• Encouraged to take increased responsibility for their approaches to learning and assessment; • Engaged in activities that draw upon their unique experiences and contexts; • Evidencing their achievements in an ePortfolio; and, • Collaborating with peers towards mutual achievement of learning goals.

In summary, the course design aims to ensure an engaging, meaningful experience for the students, responding appropriately to their likely characteristics and needs and role-modelling teaching approaches that they can, in turn, consider in their own classrooms. Students engage in their studies through a web-based Learning Management System (Desire2Learn), where they access a range of learning resources and activities and interact with their student peers and teachers through both synchronous and asynchronous modes of communication. Being fully online, students are able to adopt an 'anytime/anywhere' approach to their study, and teaching staff are purposefully 'present' in the online space – engaging with activities and responding to questions promptly and constructively. Enrolments in the course have grown significantly since its inception in 2012, defying the national VET teacher-education trend and enabling the course to become the most successful VET teacher-education course currently on offer in Australia.

Evaluation of the applied learning design principles guiding the course

A doctoral study (Downing, 2015) investigated the experiences of students in the Bachelor of Education (Applied Learning) over an eighteen month period, using the iterative process of design-based research to assess the influence and effectiveness of the applied learning design principles. Design-based research (DBR) is also known as *design research, educational design research, design experiments* and *development research*, and involves an iterative process of analysis, design, development and implementation of a specially designed intervention (Design-based Research Collective, 2003). Initally conceived and articulated by Collins (1992) and also Brown (1992), it is an approach that is particularly appropriate for educators who seek to incorporate research into practice and better understand the 'messiness' of real-world practice in a particular context. Data were collected through interviews, focus groups and student artefacts (such as assignments and online forum postings). Qualitative data analysis sought to identify themes inductively, which were then explored at a greater depth through a second layer of investigation.

The study investigated the extent to which the applied learning design principles fostered an environment where students could authentically apply what they were learning about to everyday problems and opportunities in real workplaces. Consistent with the design principles, students were expected to take a greater level of responsibility for their learning, and connect their studies to their own, unique, context in both the learning and assessment activities. This approach represents the heart of applied learning pedagogy/recognising and responding to the individuality of meaning-making and knowledge creation, and using that individuality to create more meaningful links between theory and practice. Over the three iterations of the study, the students showed a gradual and, in some cases, transformational change in the role they undertook in their own learning and in their confidence to grow professionally. Perhaps most indicative of the effectiveness of the

design principles was evidence that students were changing their own teaching practice in response to how they experienced their university learning environment.

The study revealed that applied learning design principles encouraged the students to reconceptualise their role in the learning environment. This often began with a need to (re)examine their beliefs about themselves as learners and the way in which they engaged with their teachers and peers. Rather than being passive receivers of content from an 'expert' teacher, they were introduced to new concepts, ideas, theories, frameworks and such like, and asked to examine and interrogate those in light of their existing perspectives and beliefs. Many participants with negative connotations from their school days were initially reluctant to show any behaviour that could be seen as challenging the authority of the teacher, but over time that tendency dissipated, and levels of self-confidence grew.

The findings from the doctoral study revealed that an applied learning approach that respects and integrates the students' experience and context can lead to positive, even transformational outcomes for students. Of critical importance was the need for immediate relevance of what was being studied to the every-day realities of the students' working lives – they wanted to 'put their learning to work' as soon as possible, both to maximise the value of their study and to help them to engage and maintain their commitment to study. Simply put, if studying in the course did not help them with their current and real challenges at work, withdrawal from enrolment was likely.

The conclusions of study contributed new knowledge about the characteristics and needs of non-traditional students and their behaviour in the learning environment. The investigation uncovered a persistent vulnerability for self-doubt and withdrawal, but this sat alongside a strong desire to contribute altruistically to the learning community. Indeed, it appears that the manner in which the design principles ensure opportunities to give meaningfully to the learning community may actually help non-traditional students to address concerns over their worthiness and capability to succeed in Higher Education.

Implications for pedagogical design in VET teacher education in universities

The study concluded that applied learning design can assist course developers in building an environment that more effectively links university study to the workplace and facilitates meaningful professional development. Additionally, the findings revealed that web-based technology can offer effective and engaging ways to support geographically and characteristically diverse students. Importantly too, given the growing number of non-traditional students entering university, the applied learning approach responds well to those students with a low sense of self-efficacy, who need encouragement and support while developing the confidence to engage fully in the university environment.

The study also found that teaching staff in universities should be open to reconceptualising their role in the learning environment; moving from being seen as the 'expert' to more of a facilitator, by helping students connect what they are learning with their real workplace context. This requires teaching staff to be more open to allowing a degree of modification to learning and assessment tasks in order for those tasks to be more meaningful and rewarding (both intellectually and pragmatically), and truly respecting what the students brought to the learning environment.

Summary

This paper has provided an overview of the context in Australia for VET teachers, and their continuing professional development and education. Importantly, it appears that a growing number of VET teachers are interested in pursuing a Higher Education experience, but they will need a supportive, constructive and meaningful course in order to feel confident, engaged and motivated.

The applied learning design principles that guided the course development and delivery, and the findings of the accompanying doctoral study, may well be a useful resource for other Higher Education providers seeking to build an appropriate course for VET teachers. The applied learning approach appeals on a number of levels – it responds to the characteristics of non-traditional students, it models the desired approach in VET, and it is suitable for an online or web-based mode of delivery. It is noted that this doctoral study did not aim to be a comparative one in terms of what is offered overseas. Therefore, in terms of potential further research, a study on the effectiveness of the design principles in another context or discipline would be a valuable addition to the limited literature on this pedagogical approach – an approach that appears to offer much to the Higher Education sector.

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Paradigms for Networking Universities and Vocational Education and Training (VET) Institutions on Competency-Based Further Education in Sub-Saharan Africa

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Abstract

Universities and Vocational Education and Training (VET) Institutions, as well as their faculties, pride in being independent and autonomous; which tends to promote reclusiveness and sometimes isolation. More so, the attitude of preserving institutional independence is very prevalent in VET institutions in Sub-Saharan Africa because of their sense of protecting trade secrets and remaining competitive. Furthermore, these institutions always look up to the developed countries for collaboration without fair thoughts on how they can share institutional experiences among themselves given the dissimilarities of their national development trajectory. Paradoxically, the open source community has proven that the technology community always fares better in conditions of organized collaboration, networking, and collective mindset. Thus, this paper presents to VET leaders and policymakers some paradigms for networking Universities and VET institutions on competency-based Further Education in Sub-Saharan Africa. It also explores the key themes on the challenges, policy issues and priorities for further research on networking the institutions. It is vital for Sub-Saharan Africa VET institutions to work together across the national and regional boundaries in solving the challenges of graduating incompetent workers that would never meet the employability threshold required by industries. The paper concludes that technology-assisted (cloud computing, intelligent tutors and software applications), structured networking (supported by regional bodies like African Union) among VET institutions in Sub-Saharan Africa

would not comprise competitiveness but will provide for collective growth, shared resources, institutional/professional mentoring; which will be cheaper to fund and will promote transferability of knowledge/skills given the commonality in socio-cultural heritage. Additionally, the Organization for Economic Co-operation and Development (OECD) and European Union (EU) country-level models of institutional Networking are possibilities among many for encouraging collaboration of VET institutions and Universities within the Sub-Saharan Africa.

Introduction

Networking universities and Vocational Education and Training (VET) institutions nationally and across Sub-Saharan African (SSA) countries creates the critical mass of material and human resources for galvanizing the region's human capital development. However, the isolation policies pursued by these institutions have robbed them the opportunities for collaboration and the benefits of the multiplier effects of shared resources. Prevalent is the zeal among administrators and faculty to collaborate only with institutions from the developed countries at the neglect of those with the African. The wide gap learning curves between the institutions in terms of attitude, worldview and skills set mitigates the quality of such networking. Thus, the SSA VET institutions and universities appear to be ignorant of how to share material resource, institutional experiences and technical expertise among themselves. Therefore, a networking framework that provides mechanisms for sharing experiences, transferring technology, exchanging VET information and coordinating development among Universities and VET institutions in Sub-Saharan Africa is highly needed.

A network provides ready access to a pool of energy, information and knowledge and linkage to other networks; that are of value to both individuals and institutions (Cohen and Prusak, 2001), For example, institutional networks of VET institutions and universities can be defined from the perspective of the programmes offered, national and regional levels (Séror, 1998). Other networking mixes relevant to those of VET institutions in SSA include those of unions, governments, agencies for international development, innovation centers, business incubators, professional support associations. Thus in this paper paradigms are regarded as the lens by which these networks are shaped, perceived, and structured among national as well as regional universities and VET institutions; with regards to providing competency-based Further Education in Vocational Education programmes.

In Sub-Saharan African countries, VET is delivered through three major systems: formal (private and public school systems), non-formal (community groups, training institutions, and other organizations) and informal (apprenticeship) (Ogwo and Oranu, 2006). The implementation of a dual system of Vocational Education and Training is not widespread in SSA (unlike in German where the dual system of Vocational Education has been rated positively by many researchers). Some SSA countries have started implementing the dual system while others are yet to start.

Generally, the VET systems are mainly challenged by the faculty's inadequate pedagogical skills with regards to application of technologies and current industrial/commercial practices. They are also confronting inadequate professional development opportunities and inadequate instructional materials. These challenges have impeded the implementation of competency-based programmes and as such resulted in graduating unskilled students. Therefore, it follows that competency-based Further Education programmes be designed to upskill the unskilled VET institution/university graduates as well as provide continuing professional development of the VET teachers. In some SSA countries, continuing professional development of teachers and trainers of VET programmes has been identified as a priority and a tool for reforming Vocational Education and Training systems. These countries are currently applying the concept of competency-based education and training by re-inventing or reforming their VET systems. There exists the national vocational qualification framework in some of the countries, although some of them are at the nascent stages.

Competency-based education and training is an outcome-based approach to curriculum development and implementation whereby the targeted skills derived from the industry are trained for and assessed. It has both a didactical dimension (competencies and qualifications) and a political and social dimension (pathways and opportunities for learning). Its structure includes: the course is recognized to meet national competencies standards; curriculum gives learners a clear indication of what is expected in terms of performance, conditions and standard; delivery is flexible and learners can exercise initiative in the learning process and assessment measures performance is demonstrated against a specified competence standard. Hence, the rationale for competency based Further Education and network in VET institutions includes more: cost effective, relevant, flexible, self-satisfying, self − pacing and based on specific occupational requirement.

In the above context, this paper presents to VET leaders and policymakers a framework for networking Universities and VET institutions on competency-based Further Education in Sub-Saharan Africa similar to the networking principles adopted by OECD, EU, commonwealth institutions etc. The framework is focused on networking VET institutions and Universities in SSA under the aegis of Economic Community of West African States (ECOWAS), African Union (AU), and the SADC (Southern African Development Community) etc. Industries participating in the students' internship programmes within the networked institutions should be part of the network since the employers are the ones complaining about the poor quality of the graduate. The paper explores the benefits that are derivable from implementing the framework as well as good policy issues associated with the framework.

Conceptual Framework

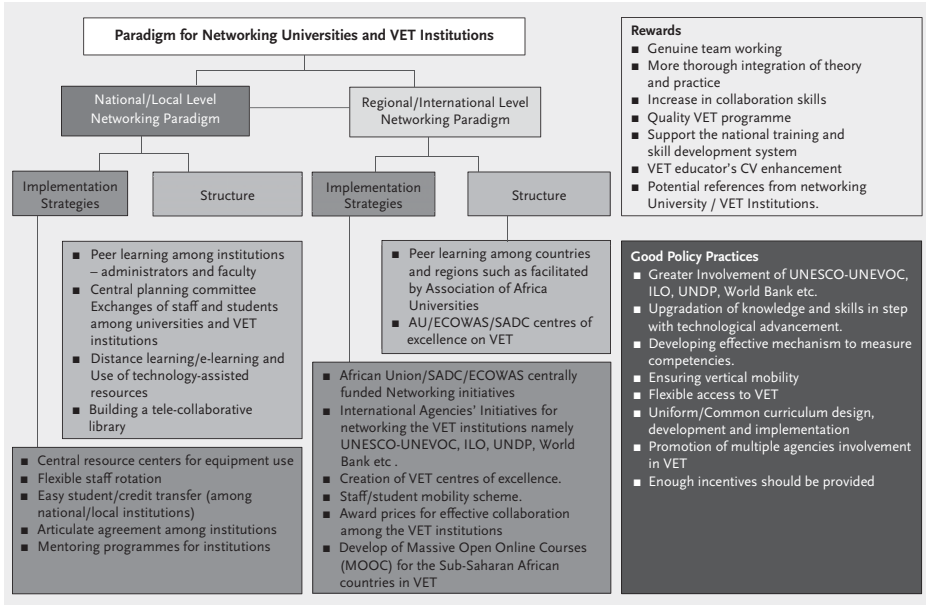

Fig. 1 A Conceptual Framework of the Paradigm for Networking Universities and VET Institutions in Sub-Saharan African Countries.

Framework for networking Universities and VET institutions on competency-based Further Education in Sub-Saharan Africa

The framework for networking universities and VET institutions on competency-based Further Education in Sub-Saharan African is outlined below. It is built around two elements: implementation strategies and structure at both the national and regional level.

National/Local level Networking Paradigm

Implementation Strategies

- *Central resource centers for equipment use*: This involves having central VET resource centers especially on competency-based Further Education, for learning resources and equipment use by the universities and VET institutions within 30 km of benefiting institutions. The centers' facilities should be provided as central resources for teaching/training purposes, as well as for internally generated revenue. Regulation applying in the use of the learning resources and equipment should aim at providing a pleasant learning and

working environment for the users of the center and helping them get the best of it.

- *Flexible staff rotation*: Developing a framework for the effective exchange of academic and administrative staff, such sabbatical leave, between/among universities and VET institutions to improve the exchange of best practices would be a valuable strategy for empowerment, retention and developing the VET workforce in Sub-Saharan Africa.
- *Easy student/credit transfer (among national/local institutions):*This involves establishing a central registry with common policies and procedures for students planning to take work at other universities and VET institutions within the same country or elsewhere. The registry should be responsible for the transfer of credit from other institutions.
- *Articulate agreement among institutions:* This involves developing a comprehensive articulation agreement (CAA) to optimize the networking benefits such as; smooth transfer of credits between/among universities and VET institutions, staff exchange, joint degree programmes etc. The focus should include: supporting current requirement in VET at all levels; establishing a process for maintaining currency; ensuring current information is generally accessible to students and teachers of VET programmes at all levels.
- *Mentoring programmes for institutions/faculty/staff (use of online platforms)*: This involves providing a discipline – specific mentoring programme model for competency-based continuing training and mentoring of VET teachers among the universities and VET institutions. The mentoring model should employ an on-line platform for continuing, two-way communication between departmental heads/chairs or programme coordinators, faculty members, course developers and adjunct staff.

Structure

Tab. 1 National/Local level structure, outlining typical features of each strategy.

Definition	Features
Peer Learning among Institutions (facilitated by national body for the universities)	
Individuals exchanging knowledge and experience with each other, and potentially diffusing this learning back to their organizations to ensure an impact – at scale – on reform initiatives.	Developing a competency-based Further Education common, clear and precise peer learning objectives, and peer engagements structured to maximize these objectives. Ensuring that the learning focus is relevant to all peers and their institutions. Individual peers should be appropriately matched, authorized and empowered to engage effectively. Learning gains of individual peers should be fed back to the institutions to ensure continued support for the learning process. The peer learning engagement process should be very simple with limited administrative demands and costs for the peers to find the process as easy as possible. The many facets of peer learning gains are to be evaluated, from initial engagement through individual learning to organizational/institutional learning and final reform impact. Building broad peer community of practice (CoP) approach is necessary to help strengthen professional associations and unions.

Definition	Features
Central Planning Committee	
The Agency responsible for central networking planning at national/local level on Universities/VET institutions competency based Further Education.	A national/local central planning committee for networking universities and VET institutions on competency-based Further Education will be established involving all the networking Universities/VET institutions at the national/local level. The purpose of the committee is to consider networking arrangement between/among the Universities and VET institutions including due diligence checks; to ensure a consistent approach to the academic and administrative support and management of the network and establish communication mechanisms across all parties and levels of the networking. The role of the committee will include discussion of a common approach to network management activities, assessment, and moderation, monitoring, and reviewing of networking arrangements, development, and application of the policy document, reviews of approval document and draft of the memorandum of cooperation. The committee may include the following people: heads and registrar of the University/VET institutions, the academic and administrative link persons, a member of quality assurance and enhancement (acting as the service officer), enterprises, social partners and other representatives of working life, including chambers of commerce and other trade organizations responsible for VET policy making and decision making.
Exchanges among Universities and VET institutions	
Sharing specific knowledge, best practices and innovative ideas.	Establish strategic collaboration and networking with enterprises, social partners, and local or national authorities to deliver high-quality competency – based further Vocational Education and Training in relation to their labour market needs. Establish project in support of exchange of best practices, innovative ideas and share of new knowledge among universities and VET institutions. As well as establishing international relationships with key stakeholders across sectors. Establish project on Tuition Exchange (TE) which entails a reciprocal scholarship opportunity for the dependents of eligible members of the networking universities and VET institutions.
Distance learning/e-learning and Use of technology-assisted resources	
A Programme of study whereby a learner would not normally be physically present in a University/VET institution site or that of a networking institution.	Effective use of web and learning software in sharing VET information and delivery of instructions on competency-based Further Education. Use of Moodle will give great opportunities in delivery competency – based further VET instructions and engaging learners on weekly tasks using Forum, Choice, Nano Gong, PowerPoint slides and Skype video calls which can offer both inter-instructional interactions and small-group discussions within a mixed group of learners from both institutions. Delivery could be shared between the University and the networking institution but a University should have responsibilities for the programme delivery, the provision of student support and the learning resources. Joint approval of the competency-based Further Education programme and module design; design and production of learning materials; content delivery and delivery support and assessment. There must be approval on the schedule of availability and readiness of any learning materials, support infrastructure, roles and responsibilities of academic and support staff and learners' access to the institutional system, support and guidance services.
Building a tele-collaborative library	
A digital library which involves an application of global computer networks for collections of VET books, periodicals, digital learning materials (instructional videos, learning objects, intelligent tutors, instructional games, recorded tapes) in institutionalized settings for use or borrowing by the public or the members of an institution/networking institutions.	Building a tele-collaborative library on competency-based further vocation education and training with a focus on collection of VET digital objects that can include text, visual materials, audio materials, instructional videos and games, stored as electronic media formats, along with the means of organizing, storing and retrieving the files and media contained in the library collection. The library can vary massively in size and scope and should be maintained by individuals, organizations affiliated with established physical library buildings or universities of VET institutions. The digital content should be locally stored or accessed remotely through computer networks. Also used in facilitating webinar.

Regional/International Level Paradigm

Implementation Strategies

- *AU/SADC/ECOWAS centrally funded networking institute:*This involves building continental and inter-regional cooperation and integration efforts of African Unions, South African Development Community, World Bank, Economic Community of West African States in funding the network. Such cooperation and support can positively contribute to capacity development, infrastructure, economic development and research and development on competency −based Further Education in VET across countries and regions. The European Training Foundation can be of immense help and the European Center for the Development of Vocational Education (cedefop) could be consulted to guide the initial set-up.
- *International Agencies' Initiatives for networking the VET institutions namely UNESCO-UNEVOC, ILO, UNDP, World Bank etc.* Some of the initiatives include; providing direct assistance to countries seeking to develop their VET systems through the provision of experts who work with a government official(s) in-country or through the development and implementation of country-specific programmes; fostering direct relationships between VET leadership across countries − at regional, international or thematic meetings. Promoting best practice in VET, through knowledge sharing and collaboration; engaging on extensive publications Programme (books, newsletters, research papers and e-documents) to enable the sharing of contemporary knowledge across the world.
- *Creation of VET centers of excellence*: This involves establishing regional/international VET Centers of Excellence specifically on competency − based further Vocational Education and Training to promote interdisciplinary activities designed to improve the quality of workforce and to promote necessary skills, knowledge and expertise needed for more sustainable societies and greener economies through offering flexible needs-driven Vocational Education and Training and competency-based education/training in line with international standards. The center should aim at occupations in sectors with particularly high growth potential, such as industrial mechanics, metalwork (with focus on machining and CNC), mechatronics and industrial electronics/electrical technology etc., offering practical further training course for teaching staff in their subject areas as well as the management staff on the best approaches to managing their institutions (quality management) and for 'green' Vocational Education and Training by facilitating regional and international networking, piloting new courses and conducting assessment and certification in line with international standards.
- *Staff/student mobility scheme:* This involves establishing international competency − based further Vocational Education and Training mobility scheme for VET students and staff such as Erasmus + (European Region Action Scheme for the Mobility of University Students) Programme, to provide teach-

ing/learning opportunities for the teaching staff of Universities and VET institutions and studying opportunities for their students. Training opportunities should be available for teaching and non-teaching staff employed in the various institutions. The sending institution and the receiving institution/enterprise must have agreed on the programme of the activities to be undertaken by the visiting staff member (Mobility Agreement) or student (Inter-Institutional Agreement) prior to the start of the mobility period.

- *Award prices for effective collaboration among the VET institutions and industries by regional bodies and international development agencies:*This involves awarding synergy prices to recognized examples of collaboration that could stand as a model of effective collaboration between/among the Universities and VET institutions in Vocational Education training and research development.
- *Develop of Massive Open Online Courses (MOOC) for the Sub-Saharan African Countries in VET:* A massive open online course (MOOC) is a model for delivering learning content online to any person who wants to take a course, with unlimited participation. Such model could be adopted for Sub-Saharan African countries on competency – based further Vocational Education and Training with emphasizes on open-access features such as open licensing of content, structure and learning goals, to promote the reuse and remixing of resources.

Structure

Tab. 2 Regional/International level structure, outlining the typical features of each strategy.

Definition	Features
Peer learning among countries and regions	
Individuals/institutions and industries exchanging knowledge and experience with each other, and potentially diffusing this learning back to their countries and regions to ensure an impact – at scale – on reform initiatives.	Developing an international competency- based further Vocational Education and Training common, clear and precise peer learning objectives, and peer engagements structured to maximize these objectives.
AU/ECOWAS/SADC centers of excellence on VET	
An entity that provides leadership, best practices, research, support and/or training on VET in Sub-Saharan African Countries.	Establish an international/regional center of excellence specifically on networking of Universities and VET institutions in innovations, best practices, capacity building, knowledge and information sharing system development and quality assurance on competency – based further Vocational Education and Training in Sub-Saharan Africa. A good example is the University of Nigeria Centre of Excellence in Technical and Vocational Education, Training and Research (CETVETAR) which was established through World Bank funding.

Rewards

The rewards for networking Universities and Vocational Education and Training (VET) Institutions on Competency Based Further Education in Sub-Saharan Africa are multi-dimensional. Some of these rewards are given in figure **2** below:

Fig. 2 Rewards for networking Universities and VET Institutions

Essential theme of the networking system

Tab. 3 Summary of the essential theme of the networking, along with the description and possible actions.

Although the conceptual framework for networking Universities and Vocational Education and Training (VET) Institutions on Competency-Based Further Education in Sub-Saharan Africa has been described above, the following themes should be recognized as critical to the successful networking of the various institutions and call for discussion.			
Sn	**Essential Theme**	**Action**	**Description**
1	Network structure	• Identify core members that will include the industries • Establish broad and clear goals and purposes (National and Regional) • Address the "hierarchy of needs" • Include a culture of trust in stated core values • Balance homogeneity and heterogeneity • Establish specific roles and functions • Establish bodies/committees and secretariat • Establish networking resource centers (national and regional)	• Ascertain the networking universities, VET institutions, and industries too; confirm the need for a network, identify expectations and focus where there is passion. • The focus is on the goals that have priority at the time, rather than on the entire range of objectives. • Design training to meet the practical needs of the VET educators/trainers and students/trainees. • Legitimize roles of sponsors and facilitators. • Establish resource centers at universities as well as in VET institutions. • Regulate minimum standards for the personal, professional and pedagogical qualifications of "official" training personnel.
2	Resources	Securing and maintaining adequate: • Joint Funding • Flexible Infrastructure • Technical expertise • Institutional capacity • Political will	• Identify sponsors and funding agencies • Training standards and learning resources should be designed to be flexible to accommodate differences in organizational/institutional size, individuals and training requirements • Flexibility in conducting training (e.g. duration)
3	Support	Maintaining supportive processes via • Chambers of commerce, ministry and industry • VET institutions and Universities • Agencies from international development • Technology • Internship provided by industries	• Greater involvement of UNESCO-UNEVOC, ILO, UNDP, World Bank in establishing and improving the networking system. • Identify and development of technological supports such as phone calls and teleconferences, electronic messaging systems (e-mail, chat rooms, lists, etc.), on-line forums, on-line directories etc. • Industries should provide job openings for students' internship and staff's externship programmes.

Sn	Essential Theme	Action	Description
4	Maturation	Mainly on focus and expansion • Work to reach a critical mass • Additional collaborative technology • Review the network structure	• Invite and actively engage new networking institutions • Implement additional collaborative technology as needed • Conduct short or mid – term evaluation and communicate the evaluation results to members/key interested and involved parties
5	Sustainability	Continue effective activities • Identify multiple opportunities for interactions • Recruit new members • Demonstrate tangible network outcomes • Redefine the network structure	• Create link with existing networks • Broaden network members and mentor the new members • Develop tangible and relevant services and resources, focusing on quality and not quantity • Revisit the network structure based on the evaluation results
6	Termination or Transition	Acknowledgment of diminishing effectiveness or transition to other issues or goals	Decide to end or transfer network

Challenges and possible remedies

Tab. 4 Challenges and Possible Remedies

Recognition of likely challenges that can mar the identified strategies and possible remedies are also proposed for further discussion.	
Challenges	**Remedies**
1. Inexperience in networking/unclear understanding of the networking strategy 2. Inadequate/limited resources (fund) for the development of learning resources. 3. Low level of technological advancement 4. Large number of participants (logistical issues) 5. Lack of commitment to the relationship, a mismatched relationship, or a misperception of the particular or multiple needs of the VET educators 6. Hesitation by VET educators to express needs for fear of professional repercussions. 7. Some institutions may misperceive VET educator's potential and set goals that are too high or low. 8. Some institutions may exclude themselves from networking as they are unaware of the limits and boundaries of such initiatives. 9. Dynamics of overdependence, "paternalistic regard," competition and desire for an institution to dominate may lead to unbalanced networking relationships/approaches. 10. Conservatism 11. Varying motivation 12. Assessment/Evaluation formats	1. Ensure adequate and clear statement of the networking strategy. 2. Ensure availability of resources, governments and development agencies. 3. Provide high-level technological skills and access to online facilities and infrastructure. 4. Ensure logistics are effectively and continuously addressed; appropriate media, learning center, time, means of travelling etc. 5. Ensure that VET educators are effectively matched as well as proper managing of the differences among them (personalities, cultures, gender etc.). 6. Build adequate trust and willingness among the VET educators in engaging fully in networking. 7. Ensure that institutional goals are moderate and of minimum standard. 8. Ensure adequate sensitization programmes on the networking initiatives among all the Universities and VET institutions in Sub-Saharan African Countries. 9. Ensure that VET educators involved in the networking reflect effectively on their learning gains and are willing to share learning back into their organizations. 10. Ensure that the universities and VET institutions involved are open to learning from the returning teacher/student and are willing to invest in learning from teacher/student. Be able to create time and spaces to bring learning home. 11. Develop joint/communal assessment tools or evaluation formats among the participating Universities and VET institutions.

Policy practices

Tab. 5 Good Policy Practices for effective implementation of the networking framework

The following good policy practices could be adopted for the effective implementation of the framework:

1. Involvement of UNESCO-UNEVOC in knowledge sharing experiences, databases and networking of universities/VET institutions.
2. Competency – based further Vocational Education and Training should provide for life-long learning and upgrading of knowledge and skills in step with technological advancement and competencies found in different occupations.
3. Developing an effective mechanism to measure competencies and recognize qualifications gained at the workplace and in foreign countries to facilitate access, learner-centered advancement and greater mobility of the VET educators.
4. Fully exploitation of the UNESCO-UNEVOC's potential to assist and facilitate the exchange of experiences, instructional materials, information on infrastructure development and use of databases to improve and reform Competency – based further Vocational Education and Training.
5. Ensuring vertical mobility to promote Competency – based further Vocational Education and Training and Development of standards for certification of competencies.
6. Flexible access to competency – based further Vocational Education and Training.
7. Involvement of university and VET institution in curriculum design, development, and delivery (Uniform/common).
8. Enlisting the cooperation of industry.
9. Enough incentives should be provided and enough room for maneuver are in place for universities and VET institutions to develop a close and committing network with each other or among themselves.

Conclusion

It is vital for Sub-Saharan Africa VET institutions and universities to work together across the national and regional boundaries in solving the challenges associated with graduating incompetent and unemployable workers. The paper therefore concludes that technology-assisted (cloud computing, intelligent tutors and software applications), structured networking (supported by regional bodies like African Union) competency – based Further Education among VET institutions in Sub-Saharan Africa would not comprise competitiveness but will provide for collective growth, shared resources, institutional/professional mentoring; which will be cheaper to fund and will promote transferability of knowledge/skills given the commonality in socio-cultural heritage. The networking Universities and VET institutions involved should be able to develop, at the institutional level, the necessary institutional guiding framework, and platforms for effecting networking among the institutions. The OECD and EU country-level networking models for institutions are adaptable for networking VET institutions and Universities in SSA which would also include industries hosting students that are on internship.

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Theory and method of reflection levels – its use in Vocational Education and Training

Martin D. Hartmann

Abstract

Vocational Education and Training (VET) has to refer to the needs of individuals in different ways. Specifically, it has to take into account precarious circumstances and a weak labour market in many countries. Therefore, it is necessary for under- or unemployed to create their own occupational opportunities. They have to be able to identify chances and to avail them in open and complex situations. To handle complex situations, suitable competences are required. Thus, VET must concentrate on neither subject discipline knowledge, nor skills development alone. To be effective in problem solving within complex situations, both should work together. Government and teachers have to develop appropriate curricula for this purpose.

VET-teachers have to know both the professional interactions, e.g. in farming, craft, industry and/or service (as domain experts) – and the associated teaching activities in school (as professional teachers). Teachers have to design active learning situations rich in opportunities for the development of competences. Teachers' university training has to address a minimum of three environments (both the above, as well as that of the university). Since managing complex situations, in particular for learning in school and university, is challenging, the author developed a theory and method of reflection levels to support educators acting in different learning environments. This theory structures activities in accordance with the abilities of the exponents. Based on this theory, it is easier to design learning situations relevant to the existing competence levels and in support of a further development of competences.

The theory and its implications are exposed.

Introduction

In order to work as a professional in Germany, one has to complete an apprenticeship of three or three and a half years. The apprenticeship is organized in a dual, or rather three-way-system of VET (enterprise, school and often third parties, like private educational institutions). In the majority of cases, enterprises need workers to perform their work responsibly and self-directed, since the tasks are complex and instructions cannot be given to every detail.

All over the world, labour has two functions: to provide a source of livelihood and – if it is a good work – to give life a sense of meaning and purpose. In many countries, there is a lack of work, thus many people are unemployed or underemployed. They have to develop ideas for their own escape from that labour market situation. In addition, they need competences to act in different segments of the labour market and/or at different levels. The need for competences and responsibility is not different from that in Germany.

The question is how appropriate competences can develop. Different systems of VET attempt to give different answers:

- One approach is to inform the learners about the subject content (often in a scientific context). This can take place verbally, using visualization or sometimes by conducting experiments. Learners then have to act based on that theoretical knowledge. Yet, often learners are not able to act adequately because they are not sufficiently informed about the circumstances required for the use of their knowledge and often they are unable to handle the necessary tools. In the context of a constructivist approach (e.g. Schmidt 1991, Reich 1998) this means, that content cannot connect to the mind. Enterprises such may train the learners, after the completion of theoretical learning, without linking to that theoretical learning content.
- The second approach is to learn within the working process (perhaps at an enterprise). The learners do what the trainer tells, demonstrates or otherwise instructs them to do or they imitate their behaviour. This kind of learning process is not systematic and mostly not science based. There are no exact explanations, the comprehension of actions is superficial and motivation can be poor, since the action takes place immediately and with several repetitions in order to take effect. There is no time to think and to reflect. Learners gain experience, but they are committed to the conditions. It is difficult to transfer the experience or knowledge to other situations. This is caused by a lack of mental restructuring.
- The third approach is to do the same at a workshop (maybe at school). Here, it is easier to learn, but the acting is generally not as consequential. Learning is often performed for its own purpose and is not contextualized. Therefore, learners lose their motivation, although they get sufficient instructions and explanations. Thus, there is no inspiration for mental restructuring and reflection on experiences.

If we want to avoid the difficulties stated above, effective learning shall not be organized as separate subjects with their own didactics. Learning must take place in full integration of theory and practise. Learning has to be organized problem oriented and complex. Therefore, teachers have to construct suitable, problem-based learning situations that give the learners the chance to connect themselves with the process, as well as the content. This can help to foster the development of competences of different dimensions (subject-, social-, human-orientated). In complex learning situations, based on an analysis of the actual working processes, learners can develop their competencies in reference to the actual working processes in their enterprises. Learners then can use complex learning tasks to reflect their experiences with a scientific background. This kind of learning is not only beneficial to German youth. It could help entrepreneurs in countries with high rates of unemployment. It is challenging to design appropriate learning situations and complex tasks, considering all the practical aspects of organizing settings, performing the teaching process, evaluating its results. The theoretical and practical approach has to be taught in teacher education. Research has to develop instruments to handle it.

I have designed a theory and method of levels of reflection (Hartmann 2005) that should help structuring complex processes in work activities and in multiple interfering educational processes. Following, I want to present this theory and method in the context of problem-based learning.

The theory of reflection levels

The theory of reflection levels assumes that learning is generally not an act of keeping something in mind, but a process that induces an opportunity for behaviour that efforts a reasonable outcome. For this, it is necessary to adapt information to existing mental concepts (Piaget 1971), to develop dynamic concepts in different dimensions (like psychomotor and cognitive or subject and communication) and the ability (as inner disposition, Erpenbeck 2007, p. XI) to transact in diverse situations and varying contexts of the concerned domain. This is what "competence" means for me. Thus, learning is a process of gaining experience **and** of distancing oneself from direct perception, through recognition of conditions and reasoning, about one's acting in relation to the aims, of which one must become aware of this process. This means:

If we act in a situation and are not experienced in its domain, we take the situation and the circumstances for granted. Usually, we initially do not think about our intentions, but we are in possession of them (Husserl e.g. 1973, 1982). To reach our unconsciously aims, we have to look for starting points. At this point there are four possible scenarios: a) we think about an object or a context; b) we just do something successfully – thus, there is no need to further think about it – or c) we act more or less (un)successful (according to Donald Schön 1983[1]: causing

1 Great thanks to Alexander Schlag (Singapore) for his hint to the oeuvre of Donald Schön.

"reflection in action". This means as a practice, we "suggests not only that we can think about doing, but we can think about doing something while doing it" p. 54); d) we step back and think about a problematic situation (called "reflection on action" according to Schön).

a) Often the situation confronts us with a main object, so that we think perhaps about its attributes or characteristics. In general, we want to manipulate the object or the situation, respectively. In consequence, we will analyse the object empirically and construct "true"[2] knowledge of it. Though we may read something about similar objects, their attributes, the categories and classifications, we often do not contextualise it. This generally leads to subject-oriented learning. The work piece, for example, consists of metal. However, metal is not metal: lead or copper are different from carbide, and we can analyse the atomic structure to understand why; though, this knowledge must not take effect on the acting.

b) Doing something in a more or less successful manner, we navigate through the process, get links and hints for the next step and in this way gain experience. This can happen in a "flow" (Cszkszentmihályi 1975). While the process is under way, we develop tacit knowledge. The way in which this takes place has been discussed by many authors (cp. Michael Polanyi 1958, Gilbert Ryle 1949, Dreyfus & Dreyfus 1980, Donald Schön 1983, Georg Hans Neuweg 2004). Tacit knowledge is somewhat inscribed in the body. The authors agreed that it is more than the actor can say. This kind of activity is reserved for experienced workers. If they, for example, handle a work piece, they know intuitively which kind of tool they have to take, how the procedure has to take place, how the body is to be positioned etc.

c) Doing something intentionally, but unaware, we may be more or less unsuccessful. Because of an exposure to unsolved problems while acting, we are forced to take note of some of the *direct* conditions and requirements that cause us not to reach our goals. We have to "reflect in action" to regulate our acting. We can use the knowledge that we gained in situations that we had negotiated before, while this situation is unique and our attention is tied to it. That means: we do not reflect in a fundamental way, but according to immediate needs. To work on the work piece, for example, we can handle the file. If we have an assortment of files, we can test and change them. If the surface is still uneven, the clamping of the tool could be responsible for it.

d) If a situation is both familiar *and* unfamiliar, we step back and reflect about the problematic situation, so we can perform problem framing and problem solving (p. 138, "reflection on action") in a fundamental way. This reflection is process-based (possibly as anticipation of a complete act, containing diagnostic, problem structuring, decision making, operation and proceeding, evaluation) and it is therefore different from item a). If there is a problem with the handling of a tool, for example, we become aware, that this is just

2 The discourse on trueness I have discussed in Hartmann (2005), chapter 2.

one of the steps to produce the sophisticated work piece. The question is, whether it is a need for this step or there are other possibilities for problem solving.

Some differences between the items may be subtle, so they might blend into one another. But, each is relevant, because they generate different procedures and experiences. Although I agree with the proposed items, for the educational contexts, it is more interesting to again and again reframe the process of problem-solving in the similar, as well as more or less different situations (different in time and by the experience of the actors in their domain). Dreyfus and Dreyfus (1980) analyse the learning process of riding bicycles, playing chess and in pilot training. They specified a "five-stages-model of mental activities involved in directed skill acquisition" (from novice to expert). They were convinced that competences are growing in the process; it is not possible to educate them. Such, it is confirmed that one cannot explain in detail, to a novice, how to ride a bicycle and thus enable her to ride it. If a novice thinks about "riding the bike in the correct way" while riding, (s)he will have an accident. Dreyfus & Dreyfus do not deny that a trainer-supervisor can help the learners. But in general, such help could only be administered through rules, given to master the situation. They deny that there could be a planned, systematic and cognitive way of education and training.

Contrary to the authors and in accordance with a moderate constructivism, learning processes need to be planned in a systematic way, even to the point of direct instruction. Planning is based on the concept of learning situations and aims to create developmental tasks for individuals. Moreover, the objective of the theory of reflection levels is to systematize learning situations and to make individual challenges visible. This objective builds on the concept "from novice to expert" by Dreyfus & Dreyfus. "Novices" (first stage) need different developmental tasks than "competent" (third stage) individuals. Questions for typecasting could be:

- What is the typical approach in a situation? This could be for instance, mastering the challenge (more or less extrinsic) or unawareness about own intentions (e.g. concretization of aims or separation of own and extrinsic motivations)?
- What are the requirements individuals (e.g. a novice in this, but with experiences in other domains[3]) have to meet before acting (e.g. unawareness about own intentions, lack of skills, knowing potential proceedings)?

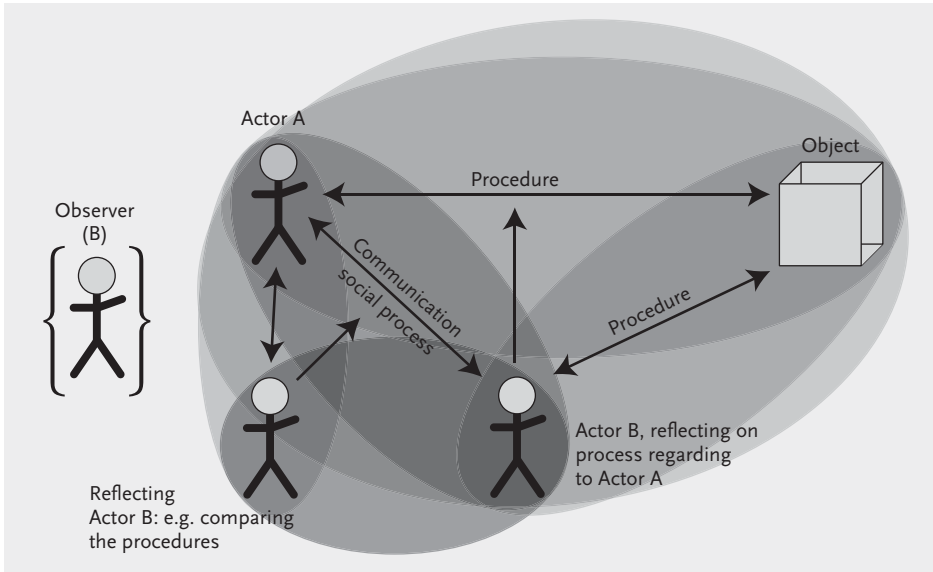
If we step forth to higher levels of expertise, the lower levels remain inherent, though in many ways "modified" and transformed. It seems that, in general, this leads to new situations. In reality, this is not the case. To make the interdependencies inherent to a given situation visible, it appears useful to structure it into levels.

3 Here, I want to point out a misconception by Bernd Lederer (2014, pp. 479) discussing my book "theory of practice" (2005). The problem is, that we have to account for three aspects: 1. History of reflection levels (I carved out eight levels in western culture since the renaissance and up to the year 2005; they affect the development of society, economy and technology), 2. Experiences (and possible reflection levels) of the individual and 3. The actual situation that is at hand. The actual situation, inter alia, depends on material circumstances (e.g. infrastructure systems). In actual situations, the historical and individual status as well as the material circumstances have to be considered.

Such, one bears in mind the complex interrelations of these levels and the interconnection between actions (e.g. in dimensions of cognition, psychomotor, affective or sorted by types of competences).

The method of reflection levels

If we train teachers to organize learning processes, that refer to special working processes (for instance in specific enterprises), then we have to account for the different levels of action and of knowledge. Each level is included in the next and binds to the next with preconditions. Every reframing reflection points to the more fundamental conditions that can be recognized within the frame: First, every time we are acting in a situation, we do it with some kind of intention; second, in process we realize what we want to do for instance, with an object, or in which way we apply a procedure, and how much effort is required, or what skills we do not possess. Because we recognize we can change the procedure; we are able to develop our skills; we can determine, which aims are really important. While we are realizing the important aims, we are objectifying ourselves. On the third level, if the activities are not successful, we must think about us, as actors in particular contexts, and about our aims in relation to the object: Are these aims making sense? Is the object suitable, we deal with? Consequently, we may choose a different object, a different procedure, different tools, and so on. – This is the aspect of the work in enterprise we need to analyse and understand.



Particularly in the educational context, this is valid, because the learning processes are mediated in multiple ways: As teachers, we have to consider the challenges, which we want to offer to the learners in a learning environment (for example

regarding to produce a sophisticated work piece of specific material). The learners' tasks are interrelated to the teachers' tasks. Based on a reflection about communication, the actions of the learner and/or the feedback from the learners, we can encompass a triangulation:

- the learner's intentions,
- how his actions were guided by us and how we have to correct the acting,
- which information we have to make available about the concerned subject disciplines, and how we inform the learner about it.

In this way, I hope, the theory and method of reflection levels support the planning of complex VET teaching situations in Germany, as well as in other countries, even of the "third world". To achieve this, VET-teachers have to know both the professional interactions, e.g. in farming, craft, industry and/or service (as domain experts) – and the associated teaching activities in school (as professional teachers). The analysis of professional situations helps to identify and differentiate the most important challenges, tasks and competences. An example is the installation of an off-grid-system for a private home or a village based on a costumers request. In the same field, but much more complex is the installation of the hybrid electrical system for a fish market or hospital that consists e.g. of the components photovoltaic system, windmill and diesel generator set. Based on this tasks and depending on the competencies of the students (perhaps they worked before in informal sector), more or less complex learning situations have to be elaborated and structured via different reflection levels. This and considerations targeting the challenges of the labour market, led us during the development of a curriculum for further education in photovoltaic in cooperation with institutions in Senegal (see the article of Eric Wendkouni Sawadogo at this conference). We hope that this supports the growth of employment to a level of prosperity entrepreneurship.

Conclusion

The theory and method of reflection levels can be a good tool for the analysis, planning, and development of complex learning situations. It opens the eye for the structure and the logic of the work and action processes (and the methods used) at different levels. It shows the dependencies and interactions which are in complex situations of the practice or in the mind of the various stakeholders. Whether we deal with the production of work piece due to an order of a customer, with various techniques (such as drilling, filing or milling) and appropriate tools or with the installation of a simple PV home system, taking into account the conditions and the financial aspects. In either case, the facts (e.g. to the materials to the system to the relevant interactions, processes) and the execution of the procedures have to be learned. But more than that: The complex interactions of materials and systems have to be understood in process of production, of installation, and of use of the products and systems (quality assurance). Furthermore, they must be understood as interaction in problem fields e.g. of natural science, technology, ecology, and as social, economic and cultural interactions.

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Further Education for Technical and Vocational Education and Training Teachers at Pedagogical University, Maputo

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Abstract

Technical and Vocational Education and Training (TVET) plays a major role in preparing skilled workers for the labor market in Mozambique. In recognition of this role, the government has prioritized in its strategic plan the improvement of teachers professional development at all levels of the national Education System (SNE). This has culminated in the Professional Education Reform (REP) in partnership with the private sector, civil society and international organizations. One of the main objectives of the reform is that all policies, programmes and strategic plans of education in Mozambique should be aligned to training, construction and resources (material and human) of all professional education subsystems. This objective will be achieved through a process of development of training and improvement models and curricula while securing the business sector in order to promote economic and social development of the country. In line with this, the Higher Technical School (ESTEC) and its German partner, Rostock University, jointly designed a project for the TVET teacher training quality improvement in Mozambique. The programme is a design-oriented, cost-effective, integrated and decentralized model for teacher training. In this joint initiative, Rostock University supports the initiated reform process in the Mozambican Vocational Education system through the Vocational Education Training Network (VETNET). VETNET encompasses three universities in Sub-Saharan countries, that is, Jimma University in Ethiopia, Witwatersrand University in South Africa and Pedagogical University in Mozambique. The central idea of the programme is to conduct a master training of trainers whose task is to train TVET instructors on vocational competencies and open avenues for shared use of laboratories among the TVET institutions. This study sought to analyze this Further Education project for Technical and Vocational Education and Training (TVET) teachers at Pedagogical University in Maputo. The findings of the study

point to a need to restructure teacher training in Vocational Education particularly in curriculum development and design of didactically rafted lesson plans. In addition, Further Education programmes should be enriched to foster continuous development not only in the professional qualifications and skills, but also in the furtherance of general knowledge, development of values of independence and responsibility that are indispensable in today's world. The study concludes that despite efforts by the government, there is still low efficiency and quality in Vocational Education teacher training in both technical and pedagogical skills.

Introduction

The history of TVET teacher education in Mozambique dates back to as early as 1980 when the Industrial Pedagogical Institute of Nampula specialized in training of Professional Education teachers in the various technical disciplines. Prior to this, primary focus was on technical staff training to support TVET. Besides the training of technical staff, there was also intensive teacher training courses for this subsystem whose potential candidates were the finalists of Commercial and Industrial Institutes. These trainees received psycho-pedagogical training, in addition to technical training. From 1983 to 1987, Commercial Institute was born to train teachers for commercial schools (MINED, 1992, pp. 41−43). However due to various factors such as low wages and other forms of incentives, shortages of expertise in such areas as economy, administration and construction, several teachers left the TVET system. This move increased gaps professional technical education in the country.

Furthermore, the closure of the Faculty of Education at Mozambique in 1986 aggravated the situation of this subsystem as most teachers trained to teach technical subjects were required to teach general subjects in the national education system. The solutions adopted to circumvent this lack of teachers in some subjects specialties (mainly the industrial sector), was the hiring of professionals, who were not trained teachers, to teach this courses. These professionals were enticed into teaching by the award of scholarships for training at Pedagogical Institutes and abroad. The other incentives to ensure the retention of effective teachers in the TVET system included improving the wage situation of teachers and ensuring the implementation of training actions (logically supported by sponsors and international NGOs). In addition, the government allowed the private sector to set up technical schools and offer courses that addressed their needs (MINED, 2000, p. 15−68).

From 1989, decentralization was adopted in hiring of teachers and management of education was passed onto the Provincial Directors of Education. Thus the top managing structure was then freed from bureaucratic issues and remained only with responsibilities of policies making and strategy formulation (DINET, 2009, p. 78). It was in this context that the Provincial Educational Direction got involved in administration and management of educational policies in the provinces.

Methodology

The study targeted 1,700 participants comprising teachers, students and pedagogical directors. Structured questionnaires were administered during data collection that was conducted in the period November 2014 and December 2015. There was found that 580 active vocational teachers had no pedagogical training; 380 had never attended a teacher training institutions and 740 were teachers, but had never take part Further Education. That is meaning we have in Mozambique:

- 580 was teacher who do not have pedagogical component
- 380 were teacher on-Job-Training
- 740 were real teachers, but they do not take part in continuous building

From these data collection, it was clear to us that, the Vocational Education system has not only problems of pedagogy, but also has a teacher shortage. These and other findings helped and motivated us to develop a project that is described at the end of this chapter.

Empirical Results

The foregoing discussion shows that there are no well-structured systems for training of VET teachers in Mozambique. Hence, there is need to use the experience gained from the project between Rostock University and ESTEC to establish a local network of Mozambican teachers with UP and other TVET institutions. The teacher training strategy in the project aims at establishing a clear link between research and quality in teacher education. Firstly, research is the instrument through which contributions to the educational process can be developed in order to improve the overall quality of the product. The subsystem of the Professional Education recognizes the important contribution which the research can give to its planning for the sub-sector, for the development of practice, and for the formulation and evaluation of quality indicators. Secondly, teacher education policy is designed to improve the quality of all the provision of teacher training, in order to establish national standards for teacher training, and quality assurance systems (MINED, 2002, p. 45−89).

The teachers of the Mozambican school system were unanimous that they wish to enroll in teacher training courses offered by the Pedagogic University (UP) in order to improve their delivery of content in their classrooms. Teacher training courses aimed at improving education in the classroom run for six months, a period that marks the end of the academic year. Teachers have the opportunity to improve their skills through training in the classroom, because many teachers don‘t have the pedagogical component, particularly in Engineering and Information Technology and Communication, where we have more difficulties in recruiting.

Although the majority of those professionals having deficient skill in the didactic, pedagogical and methodological component. The fact that they are successful pro-

fessionals does not mean they have the ability for University teaching. To compensate for this shortcoming, the Pedagogical University for example, promotes annual training courses in methodology for their own teachers at different levels and different degrees (Master and PhD) in collaboration with its cooperating partners. The training prepares teachers on how to plan lessons, improve their teaching and evaluation of student learning. These courses are offered at two levels; in-house training of teachers at UP (which is discounted) and externally to teachers in other institutions who want to improve their knowledge.

The Pedagogical University is traditionally one of the institutions dedicated to teacher training for all levels of the national education system. But for many years, UP has not been able to fully meet its objectives, for example, teacher training for the subsystem of Vocational Education. In 2006, some colleges of this institution started with a new range of technical courses, something that did not constitute their routines, although this task/activity was envisaged in the strategic plan of the former MINED and the statutes of Pedagogical University. This movement led to the creation of two schools in 2008, one for technological sciences, (the Technical School – ESTEC) and another for accounting, (the School of Accounting and Management-ESCOG). The creation of these two schools forced the Pedagogical University to design a strategic plan, which could empower the two schools, both in human and material resources. To ensure sustainability of the two schools, the Pedagogical University in coordination with its cooperation partners provides not only annual training courses for teachers, but has also drawn a clear policy of faculty training at different levels (Master & PhD) for the different areas of knowledge. The other intervention that the Pedagogical University has included and implemented in its strategic plan is the continuing education programmes, where teachers also teach mini-courses for their colleagues who are enrolled for continuing education programmes. The only requirement for this co-teaching is that it must be for an appropriate programme that is institutionalized and approved by the academic and university council.

Teachers' In-service training

The task of training teachers in private institutions of Higher Education goes beyond the simple idea of "help" home teachers. Training programmes serve both to improve the faculty lecturers' qualifications, and to improve the students' learning and, consequently, the quality of the IES. According to Center for Applied Social Sciences at the University of Mogi das Cruzes, unprepared teachers for the university teaching practice seriously scratch the image of IES, with serious consequences in the market. The fact of having a master's degree or doctorate, or be a successful expert, does not mean that this professional is an educator or to have skills and competencies in didactic-pedagogic terms.

Therefore, it is necessary to create a space where professionals can be trained for the exercise of their profession, whether inside or outside the institution in which it operates (Fernandes & Aaditya 2009). To compensate for this shortcoming, the

Pedagogical University for example, promotes biannual training courses for all teachers in the following disciplines: Didactics, methodology, planning and class simulation and preparation of research projects. At the moment, the UP tries to formalize continuous Teacher Training in Mozambique and they know that teachers training is the most viable option to improve student performance. This project would involve all teachers with the condition that they have to be an active teacher in any public school. As it is at the initial phase, that's way there are no results yet, but it has a huge number of participants. That is why it is impossible to measure the success, but looking at the demand, we predict it will bring positive results.

In this chapter follows a short description of the project. From these data collection, we can say, one of the solution to this problem is that Mozambique soon needs to create a training center for teachers in service that will be used by many institutions.

From that finding, a training programme has been developed, which was implemented gradually as intensive course. We explained to our partners (University of Dresden, Magdeburg, Rostock, Oldenburg, and UFRGS etc.), that our problem is Human Resources Development. In the research, we found that one of the ways for improving the quality of the learning process is continuing building, but also teacher training. The empirical results make clear that not all teachers are pedagogues and never took part in a continuing and Further Education programme. In Mozambique from eighties and nighties, there has been no proper vocational center for teacher trainers and continuing education.

Tab. 1 The table shows the demand for teachers in the subsystem of Vocational Education.

Year	**Province**									
	Mapto	Gaza	Sofala	Inhabane	Tete	Manica	Zambeze	Nampula	Niasssa	CD
2017	57	28	27	29	19	37	37	50	24	75
2018/2019	261	554	238	353	135	68	70	50	74	47
subTotal	318	582	265	382	154	105	107	100	98	
Total	**2.233** **383 in 2017 and 1.850 in 2018/2019**									

Tab. 2 Training Programme as Temporary project result

subject/Module	Code	Month	Time			Crédit	Note
			Total	Contact	Independent		
Didactic	EV 001A	I	150	80	70	6	Obligation
Methodology	EV 002A	I	150	80	70	6	Obligation
Pedagogical	EV 003A	I	150	80	70	6	Obligation
Seminar I	EV 004A	I	50	–	50	2	Obligation
			500	**240**	**260**	**20**	
Didactic	EV 001B	II	150	80	70	6	Obligation
Methodology	EV 002B	II	150	80	70	6	Obligation
Pedagogical	EV 003B	II	150	80	70	6	Obligation
Seminar II	EV 004B	II	50	–	50	2	Obligation
			500	**240**	**260**	**20**	
Methodology Pratices	EV 001C	III	150	25	125	6	Obligation
Didactic Pratice	EV 002C	III	150	25	125	6	Obligation
Pedagogic Pratice	EV 003C	III	150	25	125	6	Obligation
Seminar III	EV 004C	III	50	–	50	2	Obligation
			500	**75**	**425**	**20**	
			1500	**555**	**945**	**60**	

Conclusion and Recommendations

Although there is a strong research culture history within the university sector in Mozambique, studies are usually academic and theoretical. The current research provides a small contribution to the practice in the classroom to the planning subsector of teacher training, besides not being able to involve the stakeholders in the classroom training institutions for teachers and schools. To establish a proper culture of research and quality standards in teacher education, the study proposes the following measures.

- Consultation with provincial departments and teacher training providers to identify priority research areas.
- Introduce a culture of research in all teacher training institutions and the emphasis of the research will be focused on the need to deepen the knowledge and exchange of experience.
- Set national standards for teacher training and task each teacher training provider with the responsibility to draw its own internal control and quality assurance.
- Develop a common curriculum for teacher training for the Mozambican Vocational Education system.
- The Scholarship Institute (IBE) should extend scholarships for continuous professional education of Vocational Education teachers in teaching methodology, pedagogy and practice.

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Fundamentals of the development of Vocational Education and Further Education of VET pedagogues in Sub-Saharan Africa

Friedhelm Eicker

Abstract

For many years, the University of Rostock/Technical Education has supported three universities from Mozambique, Ethiopia and South Africa in their effort to establish a modern educational and further educational programme for VET pedagogues. A Further Education network was established in the first steps. If more German universities support it, this network can expand to various other Sub-Saharan African countries.

This still poses the essential question which scientific approach will be the basic position. Furthermore the question is how the Further Education network of universities, vocational schools and other VET institutions should be developed locally in Sub-Saharan Africa. A constructivist approach, which is positioned between academic discipline and vocational science, will be proposed here. In the first place, university lecturers and selected teachers will be able to acquire shaping competence. A "Train the Trainer Further Education System" will be proposed.

Fundamentals of the development of Vocational Education and especially of the Further Education of VET teachers in Sub-Saharan Africa will be presented and motivated: the shaping-/competence-based and networked teaching and learning. Expectations on the development of the planned "Train the Trainer Further Education System" will be outlined according to former projects of the University of Rostock/Technical Education. It will be argued for creating and implementing a highly-flexible shaping-/competence-based and networked "Train the Trainer Further Education System".

Keywords

Vocational Education and Further Education, "Train the Trainer Further Education System", shaping-/competence-based teaching and learning

On the situation of Vocational Education and Further Education – based on projects in Mozambique, Ethiopia and South Africa

Many years of cooperation of the University of Rostock/Technical Education with the Pedagogical University of Maputo (Mozambique) have shown that it is not only the initial qualification of VET teachers and of all other VET pedagogues which is in need of a fundamental reorientation and development. Perhaps even more important is the reorientation of the further educational programme of VET pedagogues, who already work in VET schools, in companies and in other vocational educational places. This is most relevant for VET pedagogues, who deal scientifically with Vocational Education and who work at the Pedagogical University of Maputo and in its branches all over Mozambique (see i.a. Mucauque, 2010). The essential question came up which scientific approach should be applied, and how Further Education programmes for VET pedagogues should be developed regarding the locally determined possibilities. Two projects (LEFOMO, 2009–2010, and LEKOM, 2011–2012)[1] made use of a constructivist approach, an approach positioned between the relevant academic discipline and vocational science. At first, this constructivist approach, with an orientation on vocational science[2], allowed university lecturers, in cooperation with teachers and other VET pedagogues, to acquire shaping competence in a networked environment in different places across Mozambique (see University of Rostock/Technical Education, 2012)[3]. But it was obvious that the shaping competence, acquired through both projects, was not sustainable. While transferring the positive results of the projects, it became visible that in other Sub-Saharan countries too, there is the need for a shaping-/competence-based and networked approach for Further Education of VET pedagogues, which is adapted locally and oriented on a constructivist and vocational scientific approach. Smaller projects[4] together with the University in Jimma and the University of the Witwatersrand in Johannesburg could achieve the establishment of this approach in South Africa, Ethiopia and Mozambique and further develop the activities in Mozambique. As it turned out, the effort for a sustainable Further Educationof VET pedagogues led to an organized and networked Further Education system which was accredited by all. It should be possible to (further) develop the system cross-national in Sub-Saharan Africa with

1 LEFOMO: Teacher Education and Training in Mozambique; LEKOM: Teaching and Development Expertise for TVET Teachers in Mozambique.

2 The project partners entered a field, where scholars have been working on a constructivist foundation for general and vocational didactics for many years. This was ambitious because the (radical and) favoured moderate constructivism cannot be assigned and accounted to any traditional and scientific theoretical based approach. The pragmatic constructivism was sympathised by many. It was and still is assumed that the pragmatic constructivism can be accounted to the context of the dialectical and dialectical materialistic sciences with the focus on the demands of vocational sciences. Therefore it is useful for VET. Here, it cannot be dealt further with this topic. See e.g. Jank & Meyer, 2011, especially p. 133 f., 144, 187 ff., Rauner & McLean, 2008, Eicker & Haseloff, 2013, p. 11 ff.

3 Regarding shaping-/competence-based and networked education see i.a. Eicker (2009).

4 VET-Net-YoS: Initiating the further education and research network for VET professional educators in South Africa (in the German-South African Science Year 2012/2013); VET-Net: Development of an Education and Research Network for VET Professional Pedagogues in Sub-Saharan Africa (2012–2015). See i.a. Eicker & Team, 2013.

(temporary) support from other non-African countries. The system should be directed by a university and designed together with regional partners from VET schools, companies and other vocational educational environments. It should consider various pre-existing competencies, expectations of the participants and their possibilities of participation (see i.a. VET-Net Colloquium, 2013). The implementation of this system will become even more challenging after, fortunately, VET pedagogues from various Sub-Saharan countries, e.g. from Namibia, have shown interest to cooperate in the Further Education network. Also vocational scientists from German universities offered their support. The next task will be to outline a concept for a sustainable Further Education system, which meets local standards and expectations of the participants and which allows a shaping-/competence-based and networked Further Education for VET pedagogues from the various Sub-Saharan countries. Perhaps the designed and established system will be put to the test thereafter.

Main expectations on the development of a Further Education system for VET pedagogues

The project VET-Net made use of a pragmatic approach in the Further Education of VET pedagogues in Sub-Saharan Africa (and elsewhere). Some remarks and open questions related to it:

Vocational education is dominated by academic disciplines all over the word. VET pedagogues need to teach their learners technical science, economical science and other academic disciplines which are reduced didactically. Following this idea, it seems obvious that the pedagogues need to have appropriate academic knowledge in technical, economical and other sciences. This means that VET pedagogues are mainly professionals, who have more or less pedagogical or didactical knowledge and lack appropriate methodological skills. Further Education programmes of these VET pedagogues could focus on updating academic and pedagogical knowledge and on updating didactical and methodological skills.

Parts of Germany (mainly Northern Germany) and other few countries, e.g. regions in China (mainly in Beijing) are questioning the academic scientific approach on Vocational Education and are arguing for a vocational scientific approach instead[5]. The (relevant) vocation – the relevant and prospective professional tasks – must be in the focus of the Vocational Education. The learners should acquire competencies independently, which enable them to (co-)shape their professional tasks in future.

Vocational knowledge, combined with technical and economical knowledge, is necessary for this and must be applied reasonably after having taken possible alternatives into account. The relevance of this knowledge is put to test "practi-

5 Concerning the debate between a vocational science approach and an academic science approach as basic orientation of vocational education and the further education of teachers see Hartmann u. Eicker, 2001.

cally" while acting. It will be even better if every action is justified individually and in general (social justification, operational justification, etc). Educators must arrange the processes for the learners to acquire shaping competence. The learners must be put into situations in which they have to acquire shaping competence for themselves with the help of the educators. This educational approach, which is orientated on vocational sciences, does not simply require a professional VET pedagogue, who has (isolated) pedagogical, didactical and methodological skills and knowledges. Rather, educational tutors are needed, who are able to follow the whole (complex) educational path: Starting from specific working processes (which are or will be relevant for learners), to main working and learning tasks (which need to be identified) and the arrangement of educational situations (where the learners solve the tasks and acquire the relevant competencies while solving the tasks). This can be done in the classrooms, in suitable educational environments, through suitable educational media and by using the full potential of the educational environments of schools, companies and other environments; or by using the joint potential of all the various environments (see Eicker, 2006, more detailed in Eicker, 2007, especially p. 22, and Eicker, 2009). To follow this path, VET pedagogues in Sub-Saharan Africa need to acquire these complex (working and teaching) competencies at first through Further Education in order to tutor their learners in the acquisition of shaping competence.

On the one hand, the projects in Mozambique, Ethiopia and South Africa have developed much acceptance for the vocational scientific approach. The justification for this was that only a shaping-/competence-based approach in Vocational Education can lead to real education, and that the main focus of Vocational Education of professionals and workers must be on working processes (and not on techniques etc.). The reasonable consequence was to develop a constructivist educational concept (based on scientific theories), which deals with working processes as an action and therefore learning/shaping is a social and individual action. This approach formed the fundamental basis of the planned educational concept, which still needs to be tested in practice. First steps could realize this (see Eicker & Haseloff, 2013).

For this constructivist/vocational scientific approach, relevant competencies are needed or need to be developed sustainably under the pre-existing conditions for Further Education in the near future. The projects proved that these competencies could hardly be found in the universities of Maputo, in the project-related branches, in Jimma and in Johannesburg respectively in the university towns (apart from the participants of the project and selective educated VET teachers in VET schools).

The problem is that vocational pedagogues with various educational backgrounds work at the universities in particular. The spectrum of the competencies expands from restricted competencies solely in academic sciences to restricted competencies solely in the pedagogical or didactical/methodical field.

The projects made clear that an academic orientation and a vocational scientific orientation cannot be seen as alternatives for each other (they are not mutually

exclusive). The further development of the (regional, national and international) VET systems includes the universities and makes use of their leading (scientific) role, it includes the Vocational Education and Further Education of vocational scientists and vocational pedagogues and it includes the education and training of the trainees. Therefore, it can be expected that, basically, work processes will be taken into account in the context of educational expectations, which include related professional, technical, economic and/or social knowledge, and which lead to the acquisition of action competence or even better to shaping competence.

Fundamental and more or less open questions are: How can (prospective) work be taken into account, as it will be justified by (prospective) vocation? How can the relevant academics/academic disciplines still be included appropriately without losing acknowledged academic knowledge? How can it be achieved that shaping competence will really be acquired (and that not only any action is the aim but – as alternative – shaping with regards to future expectations)? What basic consequences derive from a justified basic position, which is defined in that way, for the (further) development of VET and for the education and Further Education of VET pedagogues (with regards to the real possibilities of implementation and realisation)? Further questions still need to be solved.

General remarks on the planned design of the Further Education system

The (further) design of a promising Further Education System depends on the current VET situation in the countries of Sub-Saharan Africa and elsewhere[6]. Answering the following questions could be crucial in this respect: How is the respective VET system basically structured? Is a systematic Further Education for VET pedagogues already present? What role will the universities play possibly? Is there potential for Further Education in the VET schools or in other vocational settings? Who are the participants of the Further Education and how were they recruited? What degree of (academic) education do the participants already have and what degree can they achieve? This also includes: What is the workload for the participants (and therefore, can the Further Education be intensified)? How are the operational and working competencies of the teachers of the Further Education programme rated? How can the educational possibilities be rated, which are relevant for Further Education (in the universities, in VET schools, in companies, Research & Development institutions etc.)?

Probably, it must be assumed that the (further) development of the Further Education for VET pedagogues in the countries of Sub-Saharan African can only be re-

6 Therefore it is necessary and helpful that the African participants of the Symposium present "their" training and further education system and the further education for VET pedagogues, and that they present possibilities of the further development of this system. Insights of the participants of Mozambique, Ethiopia and South Africa from the preceding projects can serve as a suggestion. It is also helpful that non-African participants present their relevant experience and contribute with this experience. Consequences of this need to be discussed.

alised extra occupational and as practical as possible. Single Further Education modules have to be planned, after which participants can drop out and where they can rejoin sooner or later. Special modules or rather learning projects seem suitable for this, where step-by-step the acquired competencies (in the field of VET pedagogy, vocational science, professionalism) increase and certificates/qualifications can be attained. The Further Education sessions (modules, learning projects) and the outcome must prove advantageous for the professors/lectors and teacher as soon as possible. Following the basic position outlined above, it makes sense to focus in detail on the working tasks of the participants of the Further Education programme. If this applies, the following questions need to be solved: How can such a highly-flexible Further Education system, which is oriented practically, be structured in detail? How can the single modules/learning projects relate to the working tasks of the participants of the further education/of the learners? How can certificates on (shaping-) competencies be issued usefully? How can the initial qualification (competence) to enter an advanced Further Education programme be assessed etc.?

The projects preceding this Symposium have proven that creating and implementing a Further Education system can be successful through joint efforts, so called "Further Education network" – at least more successful as if the partners "only" cooperate or if each partner works on its own. The initiative and contribution of more advanced partners is especially important – at least in the initial phase. The cooperation and the task to implement a Further Education system together, which meets regional characteristics, expands the scope of design: The (various) experiences by advanced partners can be used in order to ease the first steps. This makes a permanent exchange of ideas possible and it allows to detect mistakes and misleading ideas/wrong tracks earlier. New competencies, structures and contents for the Further Education programme can be identified, implemented and acquired fast.

Open questions still remained during the preceding projects: Do we have to consider different mandates of Further Education in the countries/regions and how can we meet these standards? Are there any barriers or obstacles, which prevent the "synchronization", and how can we break through these obstacles? Does the content of the Further Education programmes differ and what are the consequences for the joint effort? These and further questions need to be considered and solved.

The given cultural differences and economic possibilities for the design of a Further Education programme need special consideration in the joint effort and cooperation. In particular, this concerns the African countries (and, of course, the specifics of the cooperating non-African countries). Preceding projects did not see these differences for too long or did not take them into account. This had an impact on the success of the projects. Therefore, the question is posed, whether (and how) a shaping-/competence-oriented and networked Further Education for VET pedagogues can be termed as a desirable development strategy in the process of VET in Mozambique, South Africa and Ethiopia. This includes the question, how potential for design can be used and developed in the various countries of the African partners.

Outlook

The hope is that this Symposium and the following pragmatic approach will pave the way for the "Train the Trainer Further Education System" (and that the open questions will be solved). The experiences from projects preceding this symposium led to the development of a first proposal for a "Train the Trainer Further Education system" (TtT-System). It will be presented on another occasion during this Symposium (see paper by Gesine Haseloff).

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The Train the Trainer-System – Results of a research and development project for and with VET pedagogues in Sub-Saharan Africa

Gesine Haseloff

This paper argues for a shaping competence oriented further education for VET educators. A model of a Train the Trainer-System (TtT-System) in Sub-Saharan Africa is presented. It was initiated during a research and development project (Further Education and Research Network for VET Professionals in Sub-Saharan Africa, short: VET-Net). Requirements are named for this system. The approach is presented how these can be met.

It was the first step in the project VET-Net to establish a network of further education and research for and with VET pedagogues in Subsaharan Africa. Germany and three African countries and universities worked together: The University of the Witwatersrand (WITs) in Johannesburg in South Africa, Universidade Pedagogica (UP) in Mozambique, the Jimma University (JU) in Ethiopia and the University of Rostock in Germany. The cooperation between these universities evolved from Alumni Projects. Two scientists from each university were involved. They founded informal and thematic research teams. The international cooperation between the teams was closely related on the basis of the project. Several VET institutions, which cooperated with the African universities in the regions, were involved. The project led to the joint development of a model for a shaping competence oriented and networked further education system. The model is not a fully differentiated pattern of action. Rather it is an outline, which can lead the way to design a Further Education System.

Amongst other countries, Mozambique, South Africa and Ethiopia have to face the challenge to meet the requirements of the economy for well-trained professionals. Furthermore they have to fulfil the needs of the trainees and employees for qualifi-

cation and further education, which ensures a satisfying occupation and which can be fulfilled through existing educational structures.

The African partner universities considered it as their task to participate in solving these problems. They recognised their way in the expansion of the existing educational structures, in this case in the field of the further education for teachers of VET.

Taking the current situation into account, the scientists found that especially the VET staff could not meet the requirements for modern teaching and learning. An appropriate further education should be offered. The Rostock University, Chair of Technical Education, offered its support during the VET-Net project (Further Education and Research Network for VET Professionals in Sub-Saharan Africa). It was not promised to transfer further education according to the German model. The project partners developed a concept on the basis of vocational sciences, within the scope of specific social, cultural and economic conditions of the individual countries.

The possibility for learners to gain shaping competence by work on real working tasks was the basic idea for the planned further education concept. VET must enable learners to shape work within the context of conceptions basing on the development of society. Shaping competence is based on the creative quality of self-dependent action and on the content of individual leeway (Rauner, 2006, p. 57). Richter and Meyer (2004, p. 23) understand shaping competence as own actions that purposefully act on the personal, vocational and social environment and shape those. Therefore, it is necessary to look for alternatives, to estimate consequences of own actions and to decide on any procedure based on a justified evaluation. Preceding projects (Eicker and Mucauque, 2010; 2012) have shown that the requirements of the economy can be met with this approach. Working tasks were identified, which are relevant for the trainees in future. Learning and educational tasks derived from it. The tasks were designed in a way that supports self-reliance and self-activity of the learners and that suits their educational needs. The preceding projects have proven that competencies in autonomous shaping can be acquired and developed through these new educational approaches (Eicker and Mucauque, 2010; 2012).

Vocational pedagogues with various educational backgrounds worked at the three participating African universities. The spectrum of the competencies expands from restricted competencies solely in academic sciences to restricted competencies solely in the pedagogical or didactical and methodological field (Eicker and Haseloff, 2016). The African educational institutions – universities, colleges and educational administrations – sought a further education programme for their professors, teachers and educational administrators, which is effective and can be used directly and concretely. Furthermore the institutions and the VET pedagogues had a lot of interest in gaining a certified graduation as high as possible. In this way, the institutions want to become established and represent themselves as centres for the training and Further Education for VET teachers in their countries or their regions.

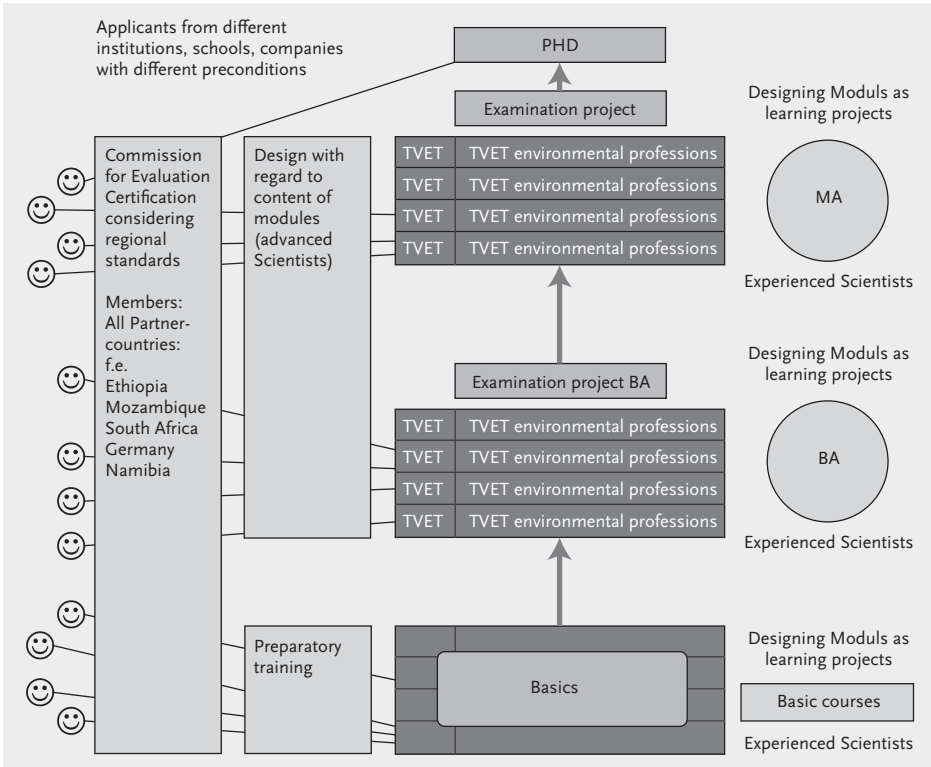
An (initial) network infrastructure was implemented. For that, regional single networks with companies, universities and colleges were setup by the WITs, the UP and the JU, and these networks were coordinated in cooperation centres. The single networks were linked with each other later to create an overall network (VET-Net), which should then expand systematically in the future. Smaller research projects were planned, executed and evaluated to accompany and complement the network. These should support to initiate and continue the planned further education programme and the setup of the network. First Further Education programmes were designed and executed. But these programmes were not implemented systematically and comprehensive. They took place from time to time and on special request. A more systematic design was desired.

It was possible for the partners and teachers, who were directly involved in the VET-Net project to acquire the relevant competence to setup and implement a shaping- and competence-oriented Further Education system (Eicker and Haseloff, 2016). But without possibilities for Further Education, other teachers will not be able to acquire the competence for shaping any time soon.

This led to the idea to develop a Further Education system, which ensures systematic Further Education – from the Bachelor to the Master to the PhD.

The VET-Net project partners decided to create an outline. A proposal was designed together at the workshop "Preparation of a TtT-System" (from 4th – 5th September 2014 at the Siemens AG in Berlin) with the VET-Net project partners, the University of Art, Berlin, and the University of Siegen. It was called Train-the-Trainer System (TtT-System). The project partners expect the discussion and development of the outline according to Grosfoguel: The idea of a procedural approach in the development of theories assumes that theory is not the final result of knowledge of an objective articulating scientist, which is valid universally. Rather it is – like any knowledge – an approach to the world, which is connected to location and stances (Grosfoguel, 2010). "Developing the system further should be part of a collective process and it should be the result of an interpretative process of social actors – here mainly VET scientists – to construct this approach to the world," (Wolf, 2009, p. 223).

The university lecturers from African universities, who deal with VET, will pave the way to develop and establish the TtT-System in cooperation (in a network) with each other. They take into account the respective cultural and economic conditions and cooperate with local partners in VET schools, companies and other environments, where Vocational Education takes place. Experienced scientist, who already designed and established Further Education study programmes, should support the development of the TtT System. Therefore, the network should expand to German partners too. The Technical University Dresden, the University of Siegen and the Alanus University of Alfter/Bonn offered their initiative and support.



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It is important to design the TtT-System highly flexible and for a heterogeneous target group from the VET field: The participants should enter, exit, re-enter before or after each module according to their possibilities in universities, schools or companies and they should therefore be able to further educate themselves throughout their whole professional life.

A commission for certification regulates the access to the Further Education programmes, checks qualifications and is responsible for admission and integration. The programme is open for professionals from any VET institution. But firstly, university lecturers and staff from the partner universities, regional TVET-teachers from colleges and trainers from companies are the main target group. They will be multipliers in the future to expand the system. It was very important for the African project partners that prospective students can be further educated extra occupational and therefore can still work in their institutions. They should be able to study in a highly flexible manner: Concerning the choice of the modules (learning projects), dates and times of their studies and the choice of their degree. Shaping-competence-oriented education should be made possible through consecutive modules or learning projects with increasing levels of difficulty. If the requirements for admission are not met by a participant, he or she will be able to attend basic or preparatory modules. It should be possible to advance from the

Bachelor to the Master to the PhD over two, three or four steps in the Further Education system.

Throughout the modules and projects, the participants identify, solve and evaluate educational tasks on their own, which are related to realistic and important vocational tasks in future and which are socially and individually justified.

The educational tasks are pivotal in each educational activity. If possible, the learners of the further education programmes should identify and justify them on their own. The learners acquire shaping competence when they pass through the five phases of complete action while solving the educational task. The five phases are: Gathering information, planning, making decisions, execution and examination (Pätzold, 2000). The learners pass through the phases on their own with the help of the teachers and they take into account alternative ways of solving the task.

The single modules (learning projects) should and must include vocational disciplines and it must be possible to differentiate between various vocational fields. This means that the modules (learning projects) are "internally" specialist oriented. The African project partners wished that firstly, the modules are oriented on technical vocations and vocations from the agriculture and environment. The modules (learning projects) allow to teach competencies of vocational pedagogy in an integrative manner. If it is necessary for individuals, special competencies will be offered parallel (e.g. building automation for technicians, resource conservation for professionals from the agricultural/environmental field).

All courses can be offered in a college, the university and, or in a company. The didactical and methodological potential of all VET institutions respectively of all persons, who are able to contribute to the further education regionally, nationally and internationally, will be used. The university and the respective competence centre should have a leading role. That allows them to keep a standard according to the vocational sciences. The system should be anchored in the region. That means that the students will be confronted with problems in the regional companies. The problems or tasks should be derived from real-life work processes. With their solutions the students will contribute to the work processes and to the development of the region. That allows them to initiate innovations in the companies and in their region. The planned "trial" approach of Further Education – networking of companies, colleges or VET schools and universities – makes relation to working processes possible and allows scientific reflection.

Relevant research and development projects should accompany the implementation process. The junior scientists and network partners will acquire relevant competencies for the implementation (this process has already begun appreciably in the project VET-Net). These competencies concern the design, the certification, the development of modules, the testing within the system and the evaluation. Furthermore, the scientists, who participate in the project, gain competencies in the management of international research networks. Consulting from experienced partners and scientists is inevitable during the phase of development in order to

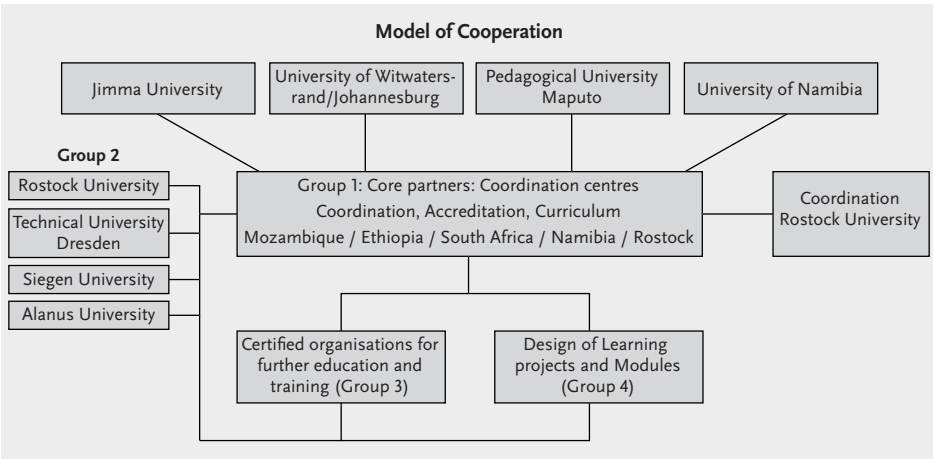
expand the quality in the widened network and to qualify junior scientists professionally. For that, the infrastructure of the network needs to be expanded.

The countries, who will participate in the project in the future, have developed a regional network on their own. Coordination centres, in future called competence centres, link these regional networks internationally. This makes cross-national exchange of resources and knowledge possible. Students and teachers can make use of the resources of the other participating partners.

The cooperation with lecturers from the various and different institutions does not only ensure the successful implementation of the TtT-System, it also opens up the possibility to reflect. The current international situation of vocational sciences has to be taken in mind, because it is inevitable for orientation on modern Vocational Education.

It can be considered to include other Sub-Saharan African universities and international partners in the reflection and invite them for further discussion, as it was done at this symposium.

Finally an example for the cooperation in the further education system is presented:



It is planned that the group of the core partners of the Universities of Rostock, Maputo, Jimma, Johannesburg and Namibia (Group 1) communicate on a regular basis regarding basic questions (design of the TtT-System, consolidation and expansion of the network). Another issue will be the development, implementation and testing of the curriculum. The group 1 will also initiate and execute necessary evaluations of the TtT-System. Scientists of the Universities Dresden, Alanus, Siegen and Rostock (Group 2) will support and counsel the core partners (Group 1).

Subordinated (to group 1), a commission for certification and measuring competencies will be founded (group 3). It deals with questions concerning admission to modules, learning projects and degrees or graduation (preparatory, basic co-

urses, Bachelor, Master, PhD) in the respective country. Depending on the region, group 3 can constitute of various partners. It can constitute of scientists and counsellors of companies and colleges as well as of representatives of administration. Another work group 4 is responsible for the design, execution and evaluation of the modules or learning projects. It constitutes of counsellors (of group 2) and scientists of the 4 African countries.

According to the explanations, the reader should bear in mind: this structure is a suggestion. It must be refined according to the conditions that are currently to be found.

The article presents a pragmatic outline. This could be helpful to establish and implement the TtT System but it needs further discussion and testing in the future.

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